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LIU (S-P.). **Studies on the Sugar Cane mosaic virus in Taiwan. Part I. Strains of the virus.**—*Rep. Taiwan Sug. Exp. Sta.*, 5, pp. 72–98, 3 pl., 1950. [Chinese with English summary.]

Since 1947 the author has been engaged on studies of strains of the sugar-cane mosaic virus, chiefly with a view to determining the number present in Formosa [*R.A.M.*, 28, p. 142]. The symptom patterns on 130 varieties in the Sugar Experiment Station's collections fell into six representative forms of definite types. Inoculation tests [ibid., 29, p. 383] on about 118 varieties with juice from canes affected by these distinctive forms of mosaic resulted in the segregation of F.108, P.O.J.2883, Co. 281, and the new seedlings 35–119 and 35–1347 as differential hosts. At least four strains of the virus were thus distinguishable by their symptom patterns [cf. ibid., 28, p. 309], infectivity, incubation period, effects on growth and yield, and so forth.

Strain A, short stripe type, derived from F. 108, P.O.J.161, and P.O.J.2210, induces on F.108 and 35-119 leaves a short stripe mottling pattern of normal green colour, the discrete streaks tending to follow the veins. A high index of infectivity and a brief incubation period are characteristic of this strain, which is ubiquitous in Formosa, spontaneously attacking F. 105, 108, 113, 130, 132, and 1108, Co. X and 285, N.C.O. 310, and possibly P.O.J. 3016. It reduces the sucrose contents of F. 108 and 1108 by 13 and 10 per cent., respectively.

Strain B, tentatively designated necrotic type, occurs naturally in Badila, 55P(u), and BH10(12). It produces on Badila, Co.281, and 35-522 a severe mottling with large, chlorotic areas, necrosis of varying extent, and marked stunting. The leaves are abnormally small and brittle, the growing-point often being blighted or dead. This strain has a very high index of infectivity and a short incubation period, and is responsible for heavy reductions in yield.

C.H.24 is the source of strain C, yellow stripe type, characterized on P.O.J.2883 and 35-1347 by the development of isolated, elongated, nearly white lesions at the base of the unfurled young leaf, some disposed separately but continuously along the same vein. Adjacent spots coalesce as they grow and form yellowish-white streaks, parallel with the midrib, not exceeding 0·4 cm. in width and often running the full length of the leaves along the veins. In old leaves the chlorosis is frequently severe enough to cause blighting, which may be only temporary, or death of the growing-point and marked stunting. The yellow stripe strain is relatively uncommon in the field, where it is found naturally infecting F.108, 110, 114, 119, 127, and 134, P.O.J. 2883 and 3016, N.C.O. 310, and other varieties. Its infectivity index is high and its incubation period short. The sucrose content of F. 110 is reduced by 58 per cent.

Strain D, fine stripe type, isolated from Hongkong bamboo cane, J. 1081, induces very mild, foliar symptoms on all the differential hosts, consisting of a regular, finely divided pattern without discoloration. The incubation period of this

strain is longer and its infectivity index lower than those of the others. Among the varieties infected by the fine stripe strain are P.O.J. 2364, 3725, 2878, and 2883, which have long been regarded as tolerant of or immune from mosaic; others occasionally found infected in the field include F. 108, 110, 1108, and 30–1097, and P.O.J. 3016. The effect of this strain on yield appears to be negligible.

It is probable that some of the Formosan strains correspond to those described from the United States [loc. cit.], and the common names provisionally assigned to the former pending comparative studies are subject to revision.

RAYSS (T[SCHARNA]). **Nouvelle contribution à l'étude de la mycoflore de Palestine (cinquième partie).** [A new contribution to the study of the mycoflora of Palestine (fifth part).]—*Palest. J. Bot.*, J. Ser., 5, 1, pp. 17–27, 2 figs., 1950. [Hebrew summary.]

The present instalment of the author's critically annotated list of Palestinian fungi [cf. *R.A.M.*, 28, p. 247] comprises 62 species of Fungi Imperfecti (including two new ones and a new form) and brings the total number of records to 589. Mention may be made of *Ascochyta fabae* on broad bean (already reported by Reichert) [ibid., 19, p. 134], *A. viciae* [ibid., 14, p. 219] on *Vicia palaestina*, *Septoria bromi* on *Bromus* sp. [ibid., 25, p. 156], *S. euonymi* on *Euonymus japonica*, *Helminthosporium cynodontis* on *Cynodon dactylon*, and *Cercospora nasturtii* on watercress [ibid., 12, p. 546].

VIENNOT-BOURGIN (G.). **Notes mycologiques.** [Mycological notes.]—*Bull. Soc. mycol. Fr.*, 66, 1, pp. 58–70, 2 figs., 1950.

A list is given of the microfungi collected in the Pelvoux massif, Dauphiné, France, in August, 1948, followed by notes on a few of the more interesting species. *Peronospora lathyrina* n.sp., found on leaflets of *Lathyrus latifolius*, forms a fragile, ochraceous-white down (brilliant when fresh) on broad necrosed spots which sometimes cover a large part of the leaflet surface. The hyaline or faintly greyish, oval or subglobular conidia measure 16 to 29 by 11 to 25 μ, mostly 18 to 24 by 14 to 19 μ, the average for 200 being 21·4 by 16·3 μ. Oospore production is copious in the dried-up parts of the leaflets; they are globose, 35·45 μ in diameter, and have a tawny, irregularly reticulated epispore.

MALENÇON (G.) & RIEUF (P.). **Contribution à la flore mycologique du Maroc : les Aspergillus.** [Contribution to the mycological flora of Morocco: the Aspergilli.] —*Bull. Soc. Sci. nat. Maroc*, 29, pp. 163–166, 1949. [Received July, 1951.]

This is a list of 18 species (representing over 900 isolates) of *Aspergillus* found by the authors up to 31st December, 1948, in Morocco and adjoining areas. Habitat and distribution are noted.

ITO (S.). **Mycological flora of Japan. II, Basidiomycetes, 3, Uredinales—Pucciniaceae, Uredinales Imperfecti.**—iii+435 pp., 454 figs., Yokendo, Tokyo, 1950.

This useful book describes in Japanese some 530 species of Pucciniaceae and 133 species of Uredinales Imperfecti recorded in Japan. The Imperfecti include four genera, of which *Aecidium* has 81 species and *Uredo* 47. The Pucciniaceae are grouped in 32 genera, including *Puccinia* with 340 spp., *Uromyces* 87, *Phragmidium* 28, and *Gymnosporangium* 11. No new species or combination is proposed. Most of the species of Pucciniaceae are provided with drawings of spores, and measurements are given in Arabic numerals in the descriptions. Literature references are provided for each species, including the translation into Latin characters of the important Japanese literature. Indexes of hosts and of rusts are given. The Melampsoraceae are not included, but Hiratsuka [*R.A.M.*, 16, p. 63] has previously published a monograph of the tribe Pucciniastreae of that family.

Coker (W. C.) & Beers (Alma H.). **The stipitate Hydnums of the Eastern United States.**—viii+211 pp., 60 pl., Chapel Hill, The University of North Carolina Press, 1951. $5. [London, Oxford University Press, 40*s.*]

This book is well illustrated with photographs of fruit bodies, usually in the fresh condition, and with drawings of spores and other microscopic features. It deals primarily with the species found in the eastern United States, but gives lists of previous illustrations of each species from various countries and of specimens examined from Europe, Canada, and elsewhere. The genera recognized are: *Sistotrema*, one species; *Steccherinum* six, including *S.* (*Hydnum*) *septentrionale*, which causes a wood-rot of deciduous trees in northern or mountainous areas of Europe, Asia, and North America; *Auriscalpium* one; *Hericium* three, including *H.* (*Hydnum*) *erinaceus*, which causes a heartwood rot of deciduous trees in the northern hemisphere; *Hydnum* four and one var.; *Phellodon* ten; *Bankera* n.gen. [without a Latin diagnosis] one; *Sarcodon* 13; *Hydnellum* 19; and *Pseudohydnum* one.

Hughes (S. J.). **Studies on micro-fungi. IV. Two fungi of Betula periderm.**—*Mycol. Pap., Commonw. mycol. Inst.*, 37, 17 pp., 5 figs., 1951. 4*s.* 6*d.*

Descriptions are given of *Melanomma subdispersum* and its conidial state, formerly known as *Helminthosporium longipilum*, and of *Coniosporium paradoxum* (Corda) Mason & Hughes n.comb., syn. *Sporidesmium paradoxum* Corda, from birch.

Hughes (S. J.). **Studies on micro-fungi. V. Acrotheca.**—*Mycol. Pap., Commonw. mycol. Inst.*, 38, 8 pp., 2 figs., 1951. 2*s.* 6*d.*

Acrotheca Fuckel is found to be *Ramularia* [*R.A.M.*, 28, p. 458], and the type species *A. gei* on *Geum urbanum* is now to be called *R. gei* (Eliass.) Lindr. *A. acuta* Grove is a saprophyte and not a *Ramularia*.

Commoner (B.) & Mercer (F.). **Inhibition of the biosynthesis of Tobacco mosaic virus by thiouracil.**—*Nature, Lond.*, 168, 4264, pp. 113–114, 1951.

In studies at the Henry Shaw School of Botany, Washington University, Missouri, a healthy, detached White Burley tobacco leaf was inoculated by rubbing with tobacco mosaic virus and kept under a bell jar at 24° C. with fluorescent lamp illumination of 120 foot candles for 24 hours. Disks of tissue were removed, washed, and floated on half-strength, sterile Vickery's solution, containing various concentrations of thiouracil, at the same temperature and light intensity. Periodically, four disks were tested for tobacco mosaic virus by the authors' method [*R.A.M.*, 30, p. 347]. Complete inhibition of virus synthesis [cf. ibid., 30, p. 447] was attained at a concentration of $4{\cdot}3 \times 10^{-5}$ *M* thiouracil. Comparable untreated disks synthesized the virus at the same rate as intact inoculated plants. At all concentrations the tissues remained turgid and epidermal cells showed protoplasmic streaming for 300 hours after inoculation. The inhibitory effect of thiouracil was partially reversed in the presence of uracil. The inhibition of virus formation by thiouracil was also secured in tissue cultures of leaf homogenates, the reduced infectivity being demonstrated by the half-leaf method on *Nicotiana glutinosa*. These results suggest that thiouracil blocks the synthesis of tobacco mosaic virus by interfering with uracil metabolism. Further work is in progress.

Sudô (E.), Yoshida (I.), Sudô (S.). **Inhibitory effect of the extract of Pachyma hoelen or Polyporus chuling in the infection of Tobacco mosaic virus 1.**—*Science* (*Japan*), 19, pp. 377–378, 1949. [Abs. in *Chem. Abstr.*, 45, 13, p. 5771, 1951.]

Judged by the results of inoculation experiments on *Nicotiana glutinosa*, the infectivity of tobacco mosaic virus was completely counteracted [cf. *R.A.M.*, 30, p. 291 and preceding and next abstract] by non-tannin-containing aqueous extracts

of *Pachyma hoelen* [(?) *Poria cocos*: ibid., 9, p. 572; 13, p. 657]. The effective substance was soluble in water but barely so in acetone or ethyl alcohol. Its action was instantaneous and its potency was not destroyed by 30 minutes' exposure to a temperature of 98° C.

HIRAI (T.). **Inactivation of plant viruses by juice of Capsicum annuum.**—*Science (Japan)*, 19, pp. 233–234, 1949. [Abs. in *Chem. Abstr.*, 45, 13, p. 5772, 1951.]

Chilli juice was found to inhibit the infectivity of potato ring spot [potato virus X] and tobacco mosaic viruses on *Nicotiana glutinosa* [see preceding abstracts]. Diluted 100 times the juice virtually lost its activity, which was not appreciably impaired, however, by exposure to a temperature of 100° C. The action of the juice was instantaneous and its potency remained unchanged after 24 hours' standing. The inhibitory effect is reversible, since the virus is reactivable by dilution of the juice.

ALCARAZ MIRA (E.). **Variedades de Tabaco resistentes al mosaico ordinario. II.—Nuevas variedades obtenidas.** [Tobacco varieties resistant to common mosaic. II. New varieties obtained.]—*Bol. Inst. Invest. agron., Madr.*, 10, pp. 9–47, 1950. [Abs. in *Plant Breed. Abstr.*, 21, 1, pp. 153–154, 1951.]

In further hybridization experiments carried out in Spain to obtain mosaic-resistant tobacco selections [cf. *R.A.M.*, 24, p. 433], highly promising hybrids were obtained from a series of crosses between hybrid 60 [loc. cit.] and Habano Gigante, Habano Mallorca, and a non-commercial line of [*Nicotiana tobacum*] var. *macrophylla*. The best of these are being crossed with Valencia and Maryland to improve their yielding ability. The resistance of the hybrids is equal to that of hybrid 60 and much greater than that of White Burley. They give a somewhat lower yield in the first crop, but the second is sometimes greater than the first and the total yield per ha. considerably higher than that of the commonly grown susceptible varieties. Hybrids 230-B and 225 have given particularly promising yields.

GÄUMANN (E.), NAEF-ROTH (STEPHI), & REUSSER (P.). **Über die Inaktivierung von Lycomarasmin durch Streptogenin.** [On the inactivation of lycomarasmin by streptogenin.]—*Phytopath. Z.*, 17, 2, pp. 229–232, 1 graph, 1950.

The results of the authors' experiments confirmed the observations of Woolley (*Bull. Soc. Chim. biol. Fr.*, 30, *Suppl. Congr. Chim. biol.*, pp. 101–113, 1949; *Rep. Proc. Congr. Microbiol., 1947*, p. 108, 1949) regarding the inactivation of lycomarasmin [*R.A.M.*, 30, p. 283 and next abstract] by a growth substance, streptogenin.

GÄUMANN (E.) & NAEF-ROTH (STEPHI). **Über die unterschiedliche biologische Wertigkeit junger Gewebe von verschieden alten Pflanzen.** [On the differing biological value of young tissue of plants of different ages.]—*Phytopath. Z.*, 17, 3, pp. 233–239, 2 graphs, 1950.

Young tomato leaves developing from either young or older growing points are less sensitive to lycomarasmin [see preceding abstract] than the young leaves formed on the original plant at the flowering stage. It is important, therefore, always to use leaves of the same age from plants of uniform age for the wilt test.

CAMPBELL (J. A.). **Good traits in new lines of Tomatoes.**—*Miss. Fm Res.*, 11, 12, pp. 1, 8, 1948. [Abs. in *Plant Breed. Abstr.*, 21, 1, p. 209, 1951.]

Practically all the commercial tomato varieties grown in the United States have now been tested at the Truck Crops Branch Experiment Station, [Mississippi], to determine the best to use in the development of better disease-resistant varieties.

Several of the lines obtained by selection from crosses with *Lycopersicon pimpinellifolium* are superior to Rutgers in yield of marketable fruit and are highly resistant to *Fusarium* wilt [*F. bulbigenum* var. *lycopersici*: *R.A.M.*, 29, pp. 84, 87]. The results of variety trials, which included lines produced at the Truck Crops Station, are given.

Škorić (V.). **Ključ za određivanje bolesti drveća.** [Key for the determination of tree diseases.]—Reprinted from *Šumarsk. Priručn.*, 2, pp. 841–853, 2 figs., 1946. [Received 1950.]

Among the fungi listed in this annotated key, arranged under hosts, for the determination of the diseases of nine species of conifer and 20 genera of broad-leaved trees [in Yugoslavia: *R.A.M.*, 30, p. 507] are *Cronartium ribicola* on pine (*Pinus strobus*) [C.M.I. map No. 6], *Pythiacystis* [*Phytophthora*] *cambivora* [ibid., No. 70] on chestnut, *Stereum purpureum* [ibid., No. 30] on beech, *Bacterium* [*Pseudomonas*] *savastanoi* and *Cycloconium oleaginum* on olive [ibid., Nos. 135, 183], *Septogloeum mori* [*R.A.M.*, 27, p. 349] and *Bacterium* [*Pseudomonas*] *mori* [ibid., 25, p. 17] on mulberry, and *Gnomonia veneta* on *Platanus occidentalis* [ibid., 30, p. 394].

Itô (K.) & Hosaka (Y.). **Notes on some leaf-spot diseases of broadleaved trees—I. Cercospora leaf spot of Plane trees.**—*Bull. For. Exp. Sta., Tokyo*, 46, pp. 17–32, 4 pl., 1950. [Japanese summary.]

Cultural studies on *Mycosphaerella platanifolia* (stat. conid. *Cercospora platanifolia*), which caused severe damage to *Platanus* spp. [*R.A.M.*, 17, p. 492] in Japanese nurseries from 1948 to 1950, are described and the data relating to conidial germination and production tabulated.

In inoculation experiments in the summer the incubation period of the disease ranged from seven to ten days. The fungus was pathogenic to *P. acerifolia*, *P. orientalis*, and *P. occidentalis*, the last-named, however, being less susceptible than the others. At the end of four months in the laboratory the percentage germination of conidia from dried leaves after 18, 25, and 42 hours' incubation was 46·7, 61·2, and 66·1, respectively, compared with only 0·8 (30 hours) when a year had elapsed. Conidia developed profusely on young cultures, but few or none were observed on those of four months. However, by consecutive subculturing at 10-day intervals active sporulation was maintained for ten months. After 25 successive transfers (nine months) the normally hyaline or light brown conidia were deep brown, granular, and often of abnormal shape, but their pathogenicity was established by inoculation experiments.

Itô (K.). **Contributions to the diseases of Poplars in Japan I. Shoot blight of Poplars caused by a new species of Pestalotia.**—*Bull. For. Exp. Sta., Tokyo*, 45, pp. 135–144, 2 pl., 1 fig., 1950. [Japanese summary.]

Pestalotia populi-nigrae Sawada & K. Itô n.sp., the agent of a severe wilt, first observed in the summer 1948, of current-year shoots of black poplars planted as windbreaks and shelterbelts near Aomori, Japan, is characterized by punctiform, globose to lenticular, irregularly scattered, erumpent acervuli, 150 to 290 by 90 to 150 μ; quadriseptate, fusoid or clavate, straight or slightly curved conidia, 21 to 30 by 7 to 9 μ, the third median loculus olivaceous, the two above it slightly darker, 13 to 18 μ long, those at either extremity hyaline, the conical or narrow-conical apical one furnished with three, rarely two or four setae, 20 to 35 by 1 μ, and the turbinate basal one, 3 to 6 μ long, with a darker-coloured, often distinct pedicel, 3 to 7 μ.

The lesions first appear as well-defined, brown areas, and a conspicuous symptom of the disease by mid-June is the presence of one or more dead leaves on the shoots.

The infection spreads rapidly, both longitudinally and horizontally, often completely girdling the shoots. The affected areas turn light tan to light brown and are often split or cracked, with numerous acervuli distributed over the surface. The usual situation of the lesions round a dead bud suggests the entry of the fungus through this channel or the adjacent necrotic tissues. The wilting and desiccation of the leaves are followed by the death of the shoot above the girdling but defoliation does not ensue for a considerable period. The fungus has not been observed on the leaves in nature. Cankers were formed in the numerous cases of late autumn infection, but the vigorous growth of the trees stimulated the rapid production of secondary periderm round the lesions, giving rise to extensive swellings by which the further advance of the pathogen was apparently inhibited. However, when nursery stocks or cuttings are attacked by *P. populi-nigrae* the resultant losses may be considerable. Besides *Populus nigra* itself, its var. *italica* and *P.* [*deltoides* var.] *monilifera* have been found affected by the wilt, which is probably widespread in the north of the country.

In inoculation experiments with conidial suspensions of the fungus, ingress was effected exclusively through wounds and infection was much more severe when a burning hot scalpel was applied to the injuries. Of the four species tested, *P. nigra* proved to be very susceptible, *P. deltoides* var. *monilifera* and *P. simonii* moderately so, and *P. maximowiczii* resistant.

STEWART (D. M.). **Heart rot of Black Ash in Minnesota.**—*Phytopathology*, 41, 6, pp. 569–570, 1 fig., 1951.

A heart rot of black ash (*Fraxinus nigra*), associated with sporophores of *Polyporus hispidus* [*R.A.M.*, 3, p. 497; cf. also ibid., 25, pp. 87, 427], was observed for the first time in Minnesota in February, 1950. Three fruiting bodies were detected about 15 to 20 ft. from the ground on three out of 80 trees examined in Lake County. At the Quetico-Superior Wilderness Research Center at Basswood Lake, on the Canadian frontier, about 15 cords of 70- to 80-year-old trees were cut, ranging from 5 to 12 in. in diameter 4½ ft. above the ground. Some 5 per cent. of this material exhibited a rot similar to that associated with the sporophores. Conspicuous, black border-zone lines of demarcation between the sound and decayed wood were present in both radial and transverse sections of the logs. Partial separation of the annual rings was observed in the radial sections. The occurrence of this wood rot may limit the utilization of the locally widespread black ash for fence posts.

BIRAGHI (A.). **Endothia parasitica e gen. Quercus.** [*Endothia parasitica* and the genus *Quercus*.]—Reprinted from *Ital. for. mont.*, 6, 1, 2 pp., 1 pl., 1951. [French and English summaries.]

Further investigations made during the summer following the discovery of *Endothia parasitica* on oak in Italy [*R.A.M.*, 29, p. 545] disclosed that 15 to 20 per cent. of the standing trees of *Quercus pubescens* on the slopes of Mt. Arciano, near Baiano, were affected, while the previous year they had shown no appreciable symptoms. The occurrence of *E. parasitica* on this host in epidemic proportions arouses fears for the future existence of these trees. Growers are advised not to make fresh plantings of oaks in areas where there are cankered chestnut trees. *Q. ilex* appears to be highly resistant. Further studies are being made on the progress of the disease on oak and the reaction of different species.

GÄUMANN (E.). **Über das Kastaniensterben in Tessin.** [On the mortality of Chestnuts in Ticino.]—Reprinted from *Schweiz. Z. Forstw.*, *1951*, 1, 20 pp., 6 pl., 1 fig., 1 graph, 3 maps, 1951. [French summary.]

In connexion with an outbreak of chestnut blight (*Endothia parasitica*) [C.M.I.

map No. 66] in the canton of Ticino, Switzerland, in 1948, the author gives an interesting summary and discussion of the information assembled to date on the origin and distribution of the disease and the life-history and host range of the fungus, and offers suggestions for its control, with special reference to local conditions. It is not yet known whether the Swiss race of the fungus is identical with the Italian [see preceding abstract].

Saccas (A. M.) & Drouillon (R.). **Étude macroscopique et microscopique de quelques champignons parasites des Aleurites en Afrique équatoriale française.** [A macroscopic and microscopic study of some parasitic fungi on *Aleurites* in French Equatorial Africa.]—*Agron. trop.*, 6, 5–6, pp. 239–264, 18 figs., 1951.

Very serious damage is caused to *Aleurites fordii* in French Equatorial Africa by *Phyllosticta aleuritidis* n.sp., which produces large necrotic spots on the leaves, sometimes causing them to die and fall prematurely. The fungus is characterized by isolated, seldom gregarious pycnidia, 100 to 150 μ in diameter, with an ostiole 10 to 15 μ wide; they are brownish or dark brown at the ostiole. The hyaline or subhyaline, unicellular, ovoid or ovoid to cylindrical pycnidiospores measure 7·5 to 10·5 by 4·5 to 6·5 (mean, 8·7 by 5·2) μ. Control consists of burning the affected leaves; when the disease is severe the trees should be sprayed preventively at the beginning of the dry season, at the beginning of the rains, and during the shorter dry season with Bordeaux or Burgundy mixture containing 1 to 1·5 per cent. copper sulphate plus a sticker, e.g. 0·05 per cent. casein.

Colletotrichum gloeosporioides var. *aleuritidis* n.var. caused maculiform spots, especially during the rainy season, on living leaves of *A. fordii* and *A. montana* at the Boukoko Station (Ubangi). The spores measure 10 to 16·5 by 3·5 to 6 (mean, 14·2 by 4·5) μ, and the setae 35 to 80 by 3·5 to 4·5 μ. It differs from the species in the size of the spores and hairs. On *A. montana* the fungus sometimes caused extensive leaf necrosis with premature leaf fall and weakening of the trees. When this occurs they should be sprayed two or three times with Bordeaux or Burgundy mixture containing 0·5 to 1 per cent. slightly alkaline copper sulphate, with a sticker.

Other fungi found less frequently and causing only minor damage include the following new to Africa: *Phyllosticta microspora* n.sp., on living leaves of *A. montana* at Boukoko and less frequently on *A. fordii*; *Ascochyta aleuritidis* n.sp. on dead or dying leaves of *Aleurites fordii* on the necrotic lesions caused by *P. aleuritidis*, but never observed alone; *Pestalotia dichaeta* [cf. *R.A.M.*, 26, p. 219], which does some damage when the necrotic spots cause leaf fall of *A. montana* and *A. fordii* at Boukoko; *Mycosphaerella aleuritidis* [cf. ibid., 29, p. 112] common on leaves of *A. montana* in experimental plots at Boukoko, its conidial state, *Cercospora aleuritidis* [cf. ibid., 21, p. 55], being common in the wet season on leaves of both species; *Glomerella cingulata* var. *aleuritidis* n.var. developing on dead leaves of both species; *Fusarium heterosporium f. aleuritidis* n.f. on necrotic spots on the leaves of *A. fordii*; *Thyridaria* sp. was observed on living branches, especially of *A. montana* growing under shade.

Pohjakallio (O.) & Vaastaja (O.). **Über Vorkommen und Sporenbildung von Coleosporium melampyri Kleb. auf verschiedenen Standorten und Wirtspflanzen.** [On the occurrence of and spore formation in *Coleosporium melampyri* Kleb. from various habitats and host plants.]—*Acta for. fenn.*, 55, 2, pp. 1–15, 1948. [Abs. in *Biol. Abstr.*, 24, 11, 3234, 1950.]

Injury caused to pines by *Coleosporium melampyri* [in Finland] is economically unimportant, seedlings 20 to 100 cm. high being attacked most severely. Spore development on pine is most abundant on fertile sites.

Thirty-first Annual Report of the Forestry Commissioners for the year ending September 30th, 1950.—London, H.M. Stationery Office, 75 pp., 11 maps, 1951.

In the section of this report [cf. *R.A.M.*, 30, p. 203] dealing with forest pathology (p. 42) it is stated that experiments have shown that the spread of *Fomes annosus* from the stumps of freshly felled pines, a trouble encountered on certain soil types in East Anglia [ibid., 30, p. 440], can be largely controlled by coating the stumps with a mixture of tar and creosote. A serious outbreak of *Melampsora pinitorqua* [cf. ibid., 28, p. 497; 30, p. 202] on Scots pine points to the inadvisability of growing this species where aspen, the alternate host, is present. Work continues on the propagation of clones of Weymouth pine [*Pinus strobus*] reported to be resistant to blister rust [*Cronartium ribicola*: ibid., 30, p. 203]. The sycamore [*Acer pseudoplatanus*] disease [ibid., 28, p. 602] has been found at Plumstead in south-east London, Staines in Middlesex, and near Guildford, Surrey.

Harrow (K. M.). **Note on the soil moisture content used with the Leutritz technique for testing toxicity of wood preservatives against fungi.**—*N.Z.J. Sci. Tech.*, Sect. B, 32, 4, pp. 39–40, 1951.

At the Department of Scientific and Industrial Research, Auckland, New Zealand, determinations showed that an initial soil moisture content of 25 per cent. is suitable for the Leutritz wood-soil contact culture method for testing the toxicity of wood preservatives towards fungi [*R.A.M.*, 25, p. 588], using *Pinus radiata* blocks, local soil, and the author's treatment technique [ibid., 29, p. 596]. This allows for a loss of 2 to 3 per cent. of soil moisture from jars during a test period, the moisture content of untreated blocks being about fibre saturation point.

Duncan (Catherine) & Richards (C. Audrey). **Evaluating wood preservatives by soil-block tests: 1. Effect of the carrier on pentachlorophenol solutions. 2. Comparison of a coal tar creosote, a petroleum containing pentachlorophenol or copper naphthenate, and mixtures of them.**—*Proc. Amer. Wood Pres. Ass.*, 46, pp. 131–151, 1 graph, 2 charts, 1950.

An account is given of an investigation carried out at the United States Bureau of Plant Industry, in co-operation with the Forest Products Laboratory and the University of Wisconsin, to test the effect of different petroleums on the toxicity and permanence of pentachlorophenol solutions as determined by the soil-block test, using as test fungi *Lentinus lepideus*, *Lenzites trabea*, and *Poria monticola* [cf. *R.A.M.*, 29, p. 2]. The test blocks, of longleaf pine (*Pinus palustris*) sapwood, were conditioned to a constant weight at 30 per cent. relative humidity and 80° F. before and after being vacuum-impregnated with the desired dilution of preservative and after weathering. Those to be tested immediately were steamed to kill surface contaminants. The remainder were strung, separated by glass beads, on nylon threads and exposed on a south roof for 60 days. The blocks were sprayed with water for five minutes three times a week if no heavy rain fell on those days.

For the test two inoculated feeder blocks on the soil surface (40 per cent. moisture) were incubated for two to three weeks before the treated blocks were added. The bottles were then kept at 80° and 70 per cent. relative humidity for 12 weeks. All the petroleums used, heavy and light gas oils, catalytic gas base oil, lube oil extract, Denver No. 3 blend, No. 200 Diesel oil, No. 400 fuel oil, No. 300 fuel oil, No. 2 fuel oil, heavy thermal side cut, Stoddard solvent, and commercial solvent, retarded the fungi, but except for the higher retentions of the catalytic gas base oil in unweathered blocks in the test against *L. trabea* (no decay), none prevented

all decay. They also appeared to influence the effectiveness of the preservative solution. In general, the effectiveness of the oil as a carrier was correlated with its boiling point, the higher boiling petroleums being the better carriers [cf. ibid., 29, p. 1]; this, however, did not apply to two high viscosity petroleums. Unweathered blocks with retentions above 2·8 lb. per cu. ft. of heavy or light gas oil, catalytic base oil, or lube oil extract, all containing 5 per cent. pentachlorophenol, were not attacked by *L. trabea* or *P. monticola*. The other oils required up to 7·2 lb. retention. After weathering a retention of 4 lb. for any of the oils (except No. 300) plus 5 per cent. pentachlorophenol prevented decay by *L. lepideus*, but higher retentions were required to preserve the blocks from the other two fungi.

The second part of the work showed that less creosote plus 5 per cent. pentachlorophenol (50: 50) in catalytic gas base oil was required to inhibit decay in unweathered and weathered test blocks than any of the other combination of preservatives tested. The next lowest was 5 per cent. pentachlorophenol in petroleum, though after weathering the difference was not significant. The third lowest threshold was for 2·5 per cent. pentachlorophenol plus 0·25 per cent. copper (as copper naphthenate) in petroleum. The other combinations required higher thresholds, especially in the weathered blocks, but 0·05 lb. copper per cu. ft. in the unweathered to a possible 0·07 lb. copper per cu. ft. in the weathered was enough to inhibit decay.

Novák (J. B.) & Vlk (J.). **Kapradinovitosť listů Křenu (Armoracia rusticana).** [Fern-leaf disease of Horse-Radish (*Armoracia rusticana*).]—*Ochr. Rost.*, 23, 4, pp. 361–362, 2 pl., 1950. [Russian and English summaries.]

Horse-radish plants growing at Malin, central Bohemia, the main horse-radish district in Czechoslovakia, were affected (1 to 2 per cent.) in the summer of 1950 by leaf mottling [*R.A.M.*, 20, p. 79; 30, p. 297] and many degenerated plants developed an interesting heterophylly, apparently of virus nature. Leaves were pinnately divided with atrophy of blades [ibid., 28, p. 43]. *Brevicoryne brassicae* was present in great numbers and is a suspected vector.

Drachovská-Šimanová (Miroslava). **Škodlivosť virových chorob, vyskytujících se na Cukrovce v ČSR.** [The damage caused by virus diseases occurring on Sugar Beet in Czechoslovakia.]—*Ochr. Rost.*, 23, 4, pp. 354–361, 2 figs., 1950. [Russian and English summaries.]

The most serious sugar beet virus diseases in Czechoslovakia are yellows and mosaic [*R.A.M.*, 11, pp. 157, 424], the latter being more virulent than in neighbouring countries [cf. ibid., 30, p. 209]. Comparing healthy and infected plants from various fields from 1948 to 1950, the author found that the average yield reduction due to virus yellows over the three-year period was 16 per cent. and of sugar content 0·6 per cent.; the respective percentages for mosaic-diseased plants were 28 and 0·7.

Hagedorn (D. J.). **The reaction of Perfection-type Peas to Wisconsin Bean virus 2 isolates from Pea.**—*Phytopathology*, 41, 6, pp. 494–498, 1951.

Eight of the 36 'Perfection-type' pea varieties tested at the Wisconsin Agricultural Experiment Station for their reaction to four 'isolates' of bean virus 2 [bean yellow mosaic virus: *R.A.M.*, 30, p. 91] were infected by one or more of the four 'isolates' used. These results were in general agreement with those obtained by McWhorter with western strains of the virus [ibid., 28, p. 370]. The fact that the names of four of the susceptible varieties included the word 'early' (Resistant Early Perfection, two brands of Early Perfection from different seed companies, and Early Perfectah) suggests the possibility of a connexion between attempts to

incorporate the very popular character of precocity into the breeding material and a further diffusion of the already widespread bean yellow mosaic virus.

HARE (W. W.). **Many varieties compared in effort to develop Cowpeas resistant to disease.**—*Miss. Fm Res.*, 13, 5, p. 1, 1950. [Abs. in *Plant Breed. Abstr.*, 21, 1, p. 214, 1951.]

Tests [in Mississippi] of cowpea varieties from various sources in 1949 showed that, in general, the Blackeye, Black Crowder, Red, and speckled field types were relatively resistant to *Fusarium* wilt [*F. bulbigenum* var. *tracheiphilum*: *R.A.M.*, 29, p. 453], while the Crowder and Lady types were more susceptible.

SMITH (M. A.) & RAMSEY (G. B.). **Brown-spot disease of Celery.**—*Bot. Gaz.*, 112, 4, pp. 393–400, 2 pl., 1 graph, 1951.

Since 1943, celery grown near Denver, Colorado, has been affected by a disease characterized by irregular, tan to brown, shallow lesions 2 to 15 mm. in diameter on the inside and outside of the leaf stalks and leaflets. While the outer leaf stalks may present abundant infection, the more central stalks are seldom affected. The lesions are often so numerous that they coalesce into areas extending for several cm. along the stalk. Curling or distortion of mature stalks may be present, and small cracks at right angles to the vascular bundles often develop in the diseased parts. The lesions on the petiolules are yellowish-brown to brown and are smaller than those on the main stalks, while those on the leaflets usually appear as yellow-brown, not sharply defined areas in the axils and leaflet notches.

Isolations from affected material yielded a *Cephalosporium* [see next page], inoculations with which by flooding the concave surfaces of mature stalks of celery plants with a conidial suspension, or spraying this on to uninjured and injured one-year-old potted plants, gave positive results, 92 per cent. of the plants becoming infected after 50 days in one experiment and 84 per cent. in another, while the controls remained free from the disease; the pathogen was re-isolated.

In culture the fungus, which is named *C. apii* n.sp., formed appressed to slightly cottony, white, later grey, mycelial colonies. The hyaline sterile hyphae were 2 to 3 μ in diameter. The brown to black, terminal and intercalary chlamydospores measured 6·2 to 9·3 by 3·6 to 8·8 μ. The hyaline, elliptical to elongate, mostly continuous, occasionally uniseptate condidia measured 7 to 16·8 by 3·4 to 5·6 μ; borne singly, they remained in mucilaginous heads 6 to 14 μ in diameter in a humid atmosphere. On potato dextrose agar plates the optimum temperature for growth was 75° F.; no growth occurred at 40° or 90°. In laboratory tests Bordeaux mixture reduced germination of the spores from 83 per cent. to 1·5 per cent. and wettable sulphur to 32 per cent.

Mushroom Science—I. The Proceedings of the First International Conference on Scientific Aspects of Mushroom Growing held at Peterborough, Northamptonshire, England, 3rd to 11th May, 1950.—111 pp., 10 figs., 17 graphs, [? 1951]. 7*s.* 6*d.*

This collection of papers and summaries of papers on scientific aspects of the cultivation of mushrooms [*Psalliota* spp.] including the methods practised in different countries, contains the following contributions on diseases. A. SARAZIN (pp. 93–95) deals [in French] with the control of môle [bubble] caused by *Mycogone* [*perniciosa*: *R.A.M.*, 16, p. 15; cf. 29, p. 493] and *Verticillium* sp. [loc. cit.]. The only method is to avoid weakening the growth of the mushrooms through excessive heat and humidity and insufficient ventilation, or through stimulating mycelial development by an excessive use of humus. Subtilon [ibid., 26, p. 447], inactive against mushrooms at the concentrations used, was very effective against the disease, but its high cost makes its use uneconomic. The expressed juice from horse manure after pasteurization was also active against the disease and non-injurious

to the crop. Its activity is being investigated. Brown spot, associated with *Pseudomonas* [*tolaasi*: ibid., 28, p. 617] and *Verticillium* [*psalliotae*: loc. cit.] can be controlled by spraying with a thiamin solution containing 1 mg. aneurin and 0·5 mg. sodium metabisulphite in 20 l. water.

J. W. Sinden & E. Hauser (pp. 96–100) describe a disease which has been present in Pennsylvania for several years. No mushrooms appeared at the first break and only a few straggling ones at the second. New ones continued to appear but died soon after reaching about half the normal size. At the third break the whole crop succumbed to a soft rot, turning slightly brown. No organism was associated with the condition, which did not recur after the houses had been cleaned out and disinfected.

A mould infection of the compost occurred in a mushroom plant in Canada, resulting in a distortion of the sporophores, accompanied by reduced production of mushrooms and severe respiratory troubles in the men emptying the houses. The same symptoms affected the men in a plant in the United States. In the early stages the mushrooms appear in patches. The caps tend to be scaly at first, but later are flat and small in comparison with the stem; they open in an immature state, with a rudimentary veil and thin gills. The tissue of the stem is spongy at the base and discoloured in the upper and peripheral parts, the discoloration merging towards the centre at the top. The texture of the cap is normal except for some discoloration along the gills, but young affected sporophores are soft. The men have a choking congestion in the chest, a dry, hacking cough with partial paralysis of the larynx and vocal chords, and typical asthmatic allergy, painful and distressing. Not all men are susceptible, and some become affected only after several days' exposure. Respirators relieved the trouble. Two fungi were constantly present in the composts of the beds, a *Spicaria* and a *Sepedonium*. The former had conidiophores 100 to 200 μ long, brownish at the base but becoming hyaline at the top, and chains of five or more globose to elliptical spores measuring 2 to 5·5 by 2 μ. The *Sepedonium* was a yellow mould which followed the *Spicaria* and grew in patches. It seemed evident that the *Spicaria* acts as the primary agent in both the mushroom and the human disease.

J. B. Yoder, J. W. Sinden, and E. Hauser (pp. 100–108) adduce evidence showing that a talc dust containing 15 per cent. parzate (zineb) [ibid., 29, pp. 221, 292] used twice a week at the rate of 100 lb. per application (500,000 sq. ft.) gave satisfactory control of bubble, *Verticillium* spot [*V. malthousei*: ibid., 29, p. 601], *Dactylium* mildew [*D.* spp., including *D. dendroides*: loc. cit.], and green mould (*Trichoderma*) [*T.* spp.: cf. ibid., 18, p. 295; 20, p. 105]. At least one application should be made before the first break is ready to pick, preferably soon after the casing soil has been moistened. Caution is still recommended in the use of this material.

Segall (R.). **Brown spot disease of Celery found in New York.**—*Plant Dis. Reptr*, 35, 3, p. 164, 1 fig., 1951. [Multilithed.]

In July, 1949, new strains of green pascal celery growing on muck soil in Orange County, New York, developed a brown discoloration on the inner surface of the petiole. A *Cephalosporium* isolated from infected tissues induced typical symptoms when re-inoculated by means of spore suspensions on to green pascal and self-blanching celery varieties. A brown spot of celery caused by a *Cephalosporium* [*C. apii*: see above, p. 554] is reported from Colorado (*Phytopathology*, 38, p. 23, 1948), the optimum growth temperature being 75° F. In 1949 the average monthly temperatures in Orange County for June, July, and August were 71·5°, 76·5°, and 74°, respectively. In 1950, when the disease was not present in the same fields, the corresponding figures were 66·3°, 70·2°, and 69·6°.

Wood (F. C.). **Some organisms associated with bacterial pit disease of cultivated Mushrooms.**—*Mushroom News* (W. Darlington & Sons, Ltd., Worthing, Sussex), 3, 4, pp. 67–72, 2 figs., 1951.

During the year bacterial pit of mushrooms [*R.A.M.*, 30, p. 303 and next abstract] was very prevalent in England, and an investigation was made of the disease in different parts of the country. In one house at least ½ ton of marketable mushrooms was lost on 3,000 sq. ft. of bed space owing to the disease. A detailed study in this house showed that the disease appeared on undeveloped buttons which rapidly became dark, shiny, and sticky. Eventually the whole house was affected. Breaks or single mushrooms appeared which were fawn-coloured and clammy to the touch. Droplets of bacterial slime exuded from the edges of the gills or between them. Their presence even where the veil was unbroken suggested that infection originated within the mushroom tissue. Later definite pits filled with bacterial slime appeared on the caps or were found to be present inside them. Mites (probably *Pigmeophorus americanus*) were in some of the pits, but many pitted mushrooms were free from them.

Isolations from the pits occurring on and inside the caps yielded *Pseudomonas fluorescens*, members of the *Bacillus subtilis* group complex, and bacterium C156 identified as a strain of *Bacterium carotovorum* [*Erwinia carotovora*: loc. cit.]. The bacterial slime yielded pure cultures of the last-named organism. Mushrooms inoculated with *E. carotovora* developed typical soft rot; the organism was re-isolated from the slime in the inoculated areas. Under experimental conditions it has not yet been possible to induce pitting.

The following control measures are recommended: growing temperatures should be maintained at 55° F., pipe heat should be sufficient to maintain a buoyant atmosphere, all affected mushrooms should be removed, watering should be done only after hard picking and only in sufficient quantity to maintain growth, the caps should then be dried by running the fans for about an hour, the casing soil should receive superphosphate at the rate of two to three handfuls per sq. yd. of bed. Spraying the beds with sodium hypochlorite solution also helps to control bacterial diseases.

Report Mushroom Research Station, Yaxley, for year 1950.—40 pp., 7 graphs, Mushroom Research Association Ltd., Yaxley, Peterborough, 1951. 5*s*.

The results of controlled laboratory experiments by Catherine Duncan on the effect of various fungicides in attempts to combat truffle (*Pseudobalsamia microspora*) [*R.A.M.*, 29, p. 601] are given on pp. 31–35 of this report [cf. ibid., 29, p. 493]. Only copper sulphate (0·01 and 0·1 per cent.) inhibited truffle growth (in one experiment) and at the same time was not harmful to the growth of mushroom mycelium.

Catherine Duncan and R. L. Edwards state that experiments on the control of bacterial pit [see preceding abstract] supported the view that inadequate ventilation is the major cause of the trouble. In trials against various diseases with dithane Z78 applied as 0·1 per cent. sprays or at 1 gal. on 50 to 100 sq. ft. of bed before fruiting or between flushes, attacks of *Mycogone perniciosa* [see above, p. 554] on two commercial mushroom farms practically ceased after treatment; on three they were greatly reduced, and on one there was no perceptible difference. On one farm losses due to *Verticillium* [*malthousei* and *V. psalliotae*] practically ceased, but on two others they persisted in spite of treatment. In two cases where production had fallen owing to heavy growth of *Sporendonema* [ibid., 30, p. 11] the disappearance of the latter after treatment was followed by a better flush of mushrooms. On two farms the effect of dithane Z78 in suppressing *Sporendonema* was striking and so was that of TMTD (thiram) on one farm.

Hewitt (W. B.). **Grape dead-arm control.**—*Plant Dis. Reptr*, 35, 3, pp. 142–143, 1 fig., 1951. [Multilithed.]

In the Sacramento and Lodi areas of California damage to vines sprayed with sodium arsenite against dead arm disease [*Cryptosporella viticola*: *R.A.M.*, 30, p. 402], caused apparently by the solution penetrating pruning wounds and leaf scars [ibid., 28, p. 376], was reduced by applying the spray as late in the season as possible. When the spray was applied before pruning, the vines were pruned several days afterwards, while if spraying was carried out after pruning, the vines were pruned early in the autumn and the spraying was effected as late in the dormant season as possible, or just before the buds opened.

In the spring of 1950 38 per cent. dinitro sec. butylphenol triethanolamine (DN-289) at 2 qts. per 100 gals. water was compared with sodium arsenite (3 qts. or an equivalent of 3 lb. of arsenic trioxide), 32 per cent. sodium dinitro-ortho-cresolate (elgetol) at 1 gal., and 76 per cent. ferbam at 3 lb. The unsprayed averaged 13·7 diseased shoots per vine as against 1·4 for sodium arsenite, 5·7 for elgetol, 8·7 for ferbam, and 2·6 for DN-289.

Hyams (E.). **Bordeaux mixture and the sulphur shortage.**—*Gdnrs' Chron.*, Ser. 3, 130, 3366, p. 14, 1951.

The author states that for some years past French vine-growers have obtained excellent control of *Plasmopara viticola* with Bordeaux mixture made (for reasons of economy) with copper nitrate instead of copper sulphate [cf. *R.A.M.*, 25, p. 225; 26, p. 294]. One quart of concentrated nitric acid is poured into a glass or earthenware vessel, and diluted with 1 qt. water. About 4 oz. scrap copper are thrown in, more being added if necessary, until all the copper that will dissolve has done so. Hydrated lime (3 lb.) is stirred into a paste with water and 10 gals. water added gradually, the mixture being stirred continuously. The copper nitrate solution is stirred into 10 gals. water in another vessel and poured into the lime water, stirring all the time. The mixture must be alkaline.

This solution is stated by French growers to be as strongly fungicidal as the copper sulphate mixture; in addition it acts as a fertilizer.

Bawden (F. C.) & Nixon (H. L.). **The application of electron microscopy to the study of plant viruses in unpurified plant extracts.**—*J. gen. Microbiol.*, 5, 1, pp. 104–109, 2 pl., 1951.

This is a fuller account of electron microscope studies at Rothamsted of unpurified preparations of plant viruses than that already noticed [*R.A.M.*, 30, p. 305]. Sap from solanaceous plants, except potato, after treatment with phosphate and freezing, was more suitable for electron microscopy than that from other hosts. The rods in sap from tobacco plants infected with tobacco mosaic [ibid., 30, p. 403] and cucumber mosaic viruses were about 15mμ wide and appeared rigid, while those of henbane mosaic, tobacco etch, and potato X and Y from tobacco [see above, p. 506] and cabbage black ring [ibid., 30, p. 297] from turnip were about 10mμ wide and apparently flexible. The spherical particles of tomato bushy stunt from Kondine Red tomato, tobacco ring spot and two tobacco necrosis viruses from tobacco were about 26 mμ in diameter. Two types of particle, one about 18 mμ and the other about 37 mμ in diameter, occurred in sap from plants infected with a third tobacco necrosis virus. No specific particles were detected in tobacco sap infected with tomato aspermy virus [ibid., 30, p. 417].

Serologically related strains of any one virus were morphologically indistinguishable, but so were some unrelated viruses. The value of electron microscopy seems to be restricted to dividing plant viruses into a number of broad groups.

Report of the International Conference on Plant Quarantine Regulations convened by the Netherlands Ministry of Agriculture in collaboration with the Food and Agriculture Organization of the United Nations, The Hague, 26 April–3 May, 1950.—40 pp., 1950. [Mimeographed.]

This brief account of the proceedings of the above Conference (pp. 1–11), convened for the discussion of proposals for improving international plant protection regulations, includes discussions on the following items: proposals for the adoption of a simplified form of certificate of health for plants and plant products; the technical qualifications of plant protection officers [*R.A.M.*, 30, p. 113]; the necessity for a centralized information and reporting service; the revision of the International Plant Protection Convention of the International Institute of Agriculture, Rome, 1929 [ibid., 8, p. 671]; and the establishment of a European Plant Protection Organization. Following the fifth annual F.A.O. Conference, when replies to a questionnaire (concerning existing national reporting services) submitted to F.A.O. member countries were examined, the Director-General of F.A.O. was authorized to proceed as expeditiously as possible with the organization of an international reporting service for plant pests and diseases and for the exchange of information on national plant quarantine regulations. Owing to limited financial resources, however, the organization may have to commence with a few major diseases and gradually widen the scope of the work, so that full coverage may not be attained for some time. It was also recommended that all countries should establish reporting services as reliable and inclusive as their resources permit.

Appendix 4 (pp. 21–26) is an address by C. J. Briejer on the organization and the first fifty year's work of the Phytopathological Service of the Netherlands. Appendix 5 gives the specific recommendations concerning the items dealt with by the Conference; appendix 6 a draft of a model certificate of health; appendix 7 (pp. 32–38) the first draft revision of the International Plant Protection Convention; and appendix 8 comments thereon.

[A shorter version of the above report appears in *Food & Agric.*, 3, 3, pp. 160–165, 1950.]

Plant disease survey for the twelve months ending 30th June, 1950. Twentieth Annual Report N.S.W. Department of Agriculture. Biological Branch–Division of Science Services.—60 pp., 1 map, [? 1951. Mimeographed.]

This is a full report of the incidence of all the diseases recorded on cultivated and miscellaneous plants in New South Wales [cf. *R.A.M.*, 26, p. 480] during the period under review, much of which has already been noticed [cf. ibid., 30, pp. 99, 141, 216, 310]. Frost was the most important cause of losses in wheat and oats [ibid., 29, p. 604]; *Puccinia graminis tritici* [ibid., 28, p. 166; 29, pp. 150, 610] was not responsible for heavy damage, though new races of the rust [ibid., 30, p. 406] attacked the formerly resistant wheat varieties Yalta, Kendee, Charter, and Gabo [ibid., 28, p. 622]. Sugar-cane Fiji disease [cf. ibid., 29, p. 478; 30, p. 78] was less prevalent, though still the most serious disease of the crop. It is considered that *Xanthomonas vasculorum* has been eradicated. Pasmo disease of flax (*Sphaerella linorum*) [ibid., 28, p. 628] occurred throughout the State. *Septoria depressa* [ibid., 28, p. 571] was responsible for less damage to citrus than in the previous year. Apple black spot [scab] (*Venturia inaequalis*) [ibid., 30, p. 168] caused a record epiphytotic, and *V. pirina* [loc. cit.] was serious on pear. An unusual feature of witches' broom virus on lucerne [ibid., 30, pp. 19, 215] is the infection in areas of only two or three years' standing. Root rot (*Rhizoctonia* [*Corticium*] *solani*) affected 70 per cent. of the lucerne plants over a large area. Wilt and stalk rot (*Sclerotinia minor*) was recorded for the first time on sunflower [cf. ibid., 29, p. 467], over 60 per cent. of the plants at Yanco Experiment Farm being affected. Squirter

disease and black end of bananas (*Nigrospora sphaerica* and *Gloeosporium musarum*) have been practically eliminated since the introduction of legislation governing control measures [ibid., 29, p. 35]. *Cymbidium* mosaic virus [ibid., 30, p. 469] was prevalent.

Plant disease notes.—*Aust. Plant Dis. Recdr*, 3, 1, pp. 1–15, 1951. [Mimeographed.]

C. J. Magee states that during 1950 the most important disease of wheat in New South Wales [see preceding abstract] was glume blotch (*Septoria nodorum*) [cf. *R.A.M.*, 27, p. 413; 29, p. 611]. W. S. Sutton reports that a single plant of the weed *Solanum nigrum* was found with a lesion from which *Corynebacterium michiganense* [ibid., 22, p. 11; 26, p. 136; 29, p. 62] was isolated; this plant was growing in a field of tomatoes at Cowra [New South Wales] where a small percentage of the crop showed bacterial canker. The bacterium from the weed host caused symptoms identical with those of bacterial canker when inoculated into tomato, and it appears, therefore, that *C. michiganense* is able to carry over on *S. nigrum*. According to L[ilian] R. Fraser, *Corticium salmonicolor* [ibid., 23, p. 25] has caused severe damage to Washington Navel and Valencia orange trees in the Bellengen River district of the North Coast of New South Wales under the abnormally wet conditions that have prevailed in the last few years.

Dyer (R. A.). **Botanical survey and research in plant diseases.**—*Fmg S. Afr.*, 25, 297, pp. 463–466, 1950.

This report is the botanical section of the Annual Report of the Department of Agriculture, South Africa, for the year ended 31st August, 1950 [cf. *R.A.M.*, 29, p. 289] and includes plant pathology. Maize ear rot (*Nigrospora oryzae*) [ibid., 26, p. 331] was found at Bloemfontein. *Helminthosporium* crown rot of maize [*H. carbonum*: ibid., 29, p. 289] responded to fertilizer applications, phosphates being the most effective; nitrogen and potassium also reduced the rot, but in the case of the latter this reduction was not accompanied by increased yield. Hybrids between commercial white maize varieties and Barberton Hickory, resistant to streak [virus: loc. cit.], showed considerable resistance in the presence of the disease, but yields were not up to the commercial level.

There were six new records of vine bacterial blight [*Erwinia viticola*: ibid., 29, p. 290]. In Wynberg and Somerset West the disease is now one of the most important limiting production.

Davíðsson (I.). **Rannsóknir á groðursjúkdómum.** [Investigations on crop diseases.]—21 pp., Reykjavík, Ríkisprentsmiðjan Gutenberg, 1951. [English summary.]

Although a crop plant disease survey conducted in Iceland between 1937 and 1950 revealed the presence of many pathogens, their numbers are far less than in those countries with which commercial relations are most extensive, indicating the necessity of controlling the importation of living plants and vegetables.

Potato blight (*Phytophthora infestans*) [C.M.I. map No. 109] occurs throughout the country, but is important only in the south, where losses (chiefly in storage) have been serious in 11 seasons since 1918. Two applications of Bordeaux mixture or perenox have been shown to reduce the damage in epiphytotic years from between 20 and 40 to 2 to 5 per cent. The most susceptible varieties are the indigenous Red Potato, Blue, and Akranes, the old Swedish Gullöga, and Early Rose, while Arran Pilot, Arctic Seedling, and Webb's Early also sustain considerable injury. Ben Lomond, Great Scot, Up-to-Date, and Eigenheimer are less susceptible, while the most resistant varieties are Alpha and Ackersegen.

Black leg (*Bacillus phytophthorus*) [*Erwinia phytophthora*: ibid., No. 131], also found in all parts of the country, is most prevalent in the south-west, where the

bulk of the imported 'seed' is used. The susceptibility of Kerr's Pink has caused a marked decline in its popularity. All the other varieties tested were more or less susceptible except the Red Icelandic. The average percentage of crop infection is 2 to 4. Potato mosaic virus [potato virus X] is commonly harboured by imported 'seed', but the paucity of aphids on the foliage precludes extensive spread. Like blight and black leg, scab [*Actinomyces scabies*] is an old-established disease of potatoes in Iceland.

Club root of cabbage [*Plasmodiophora brassicae*: ibid., No. 101] is confined to a few localities. The hosts of *Sclerotinia sclerotiorum* include lettuce and cucumber, while *Cladosporium fulvum* [ibid., No. 77] is common [on tomato] in hothouses.

Claviceps purpurea [ibid., No. 10] occurs on barley [*R.A.M.*, 28, p. 158] and other Gramineae.

Strawberry pathogens comprise *Botrytis cinerea*, *Sphaerotheca humuli*, *Mycosphaerella fragariae* [C.M.I. map No. 110], and *Diplocarpon* [*earliana*].

Among the fungi observed on *Chrysanthemum* during the period under review were *B. cinerea*, *Septoria chrysanthemella*, and *Puccinia chrysanthemi* [ibid., No. 117]. Roses sustain damage from *Sphaerotheca pannosa*, *Peronospora sparsa*, *D. rosae*, and *Phragmidium subcorticium* [*P. mucronatum*]. Rust (*Uromyces caryophyllinus*) and ring spot (*Heterosporium echinulatum*) [*Didymellina dianthi*] are among the diseases of carnation. *B. cinerea* occurs on tulips and Easter lilies, the former also being subject to infection by *Fusarium* sp. and the latter by *Rhizoctonia* [*Sclerotium*] *tuliparum*.

Myxosporium devastans was responsible for a wilt of young birch branches in 1949.

Rempe (E. H.) & Sorokina (Mme T. A.). О проникновении бактерий внутрь клеток корня. [Concerning the penetration of bacteria into the cells of the root.]—Агробиология [*Agrobiology*], *1950*, 6, pp. 135–138, 5 figs., 1950.

The authors describe some instances of bacteriotrophic nutrition of plants. Both ecto- and endotrophic types were detected. The two groups of bacteria most frequently encountered were *Ps*[*eudomonas* (*Bacterium*)] *radiobacter* and *Bacillus macerans*.

Examination of flax and wheat roots of all ages demonstrated the presence of these bacteria on the surface of the root hairs. When the numbers of bacteria are excessive they cause decay of the roots. Both species are able to penetrate easily into the root hairs, and *B. macerans* into the root tissues.

Blair (I. D.). **Wheat seed testing with reference to covered smut disease, pre-emergence loss, and fungicidal dust coverage.**—*N.Z. J. Sci. Tech.*, Sect. A, 32, 4, pp. 1–21, 9 figs., 3 diags., 1 graph, 1950 (published March, 1951).

Wheat seed samples from the 1947 and 1948 harvests examined at Canterbury Agricultural College, Lincoln, New Zealand, were found to carry *Tilletia caries* and *T. foetens* [*T. foetida*: *R.A.M.*, 28, p. 378] to the extent of 17·4 and 8·9 per cent. for the two seasons, respectively. Various procedures for determining the adequacy of fungicidal dust coverage are described [cf. ibid., 30, p. 424]; of 185 treated seed samples from commercial distributors only 11 carried the 2 oz. per bush. dust load claimed for all the samples. The importance of having a load between 1·5 and 2 oz. per bush. for adequate plant establishment and protection is emphasized by the results of inoculation experiments with the covered smut fungi and *Fusarium culmorum*, *F. avenaceum*, and *F. graminearum* [*Gibberella zeae*: ibid., 29, p. 15]. Inoculated Cross 7 wheat seed carrying a pre-determined dust load was sown in field plots and in boxes of garden soil. Plants from seed dusted at over 10 oz. per bush. were very stunted and delayed in growth, while 0·5 and 1 oz. per bush. were not sufficient to prevent significant outbreaks of covered smut.

In general the dusting machines used in New Zealand conform to either the rack-feed and star-feed revolving cylinder or spiral feed types. A machine which mixes seed and dust vigorously has been developed by the Canterbury (N.Z.) Seed Co., Christchurch. A heavy dust flow is directed into the cylinder and any surplus is collected at the lower end. This machine has generally achieved good dust coverage. Brief descriptions are given of dusting machines recently developed overseas. The author recommends the establishment of a disinfectant dust cover standard within the requirements of official seed inspection and certification. Seed coverage can be gauged quite easily from examination of a small sample under a low-power binocular microscope.

Kulik (S. A.). Образование видов у грибов Fusarium в искусственных условиях. [Formation of species in the fungus *Fusarium* under artificial conditions.]—Агробиология [*Agrobiology*], *1950*, 6, pp. 28–36, 7 figs., 1950.

During the course of isolations from the underground parts of wheat plants over a period of two years at the Plant Protection Laboratory of the Siberian Scientific Research Institute for Cereal Farming, Omsk, 38 strains of *Fusarium* spp. were obtained. From all kinds of wheat seed *F. avenaceum* [*R.A.M.*, 28, p. 184] was the only one isolated; it was never encountered in the roots or in the soil and only rarely on the collar.

Single-spore cultures of *F. avenaceum*, which showed constant growth characters on potato dextrose agar, were grown in soil. From 108 of these cultures four days later only *F. herbarum* [*F. avenaceum*: ibid., 16, p. 243] could be isolated. These latter isolates maintained their characters when grown on various agars and natural media, such as wheat and rice grains, and continued to do so through three generations of single-spore cultures. After alternate low and high temperature treatments it was found that the mycelium which developed from one end of a single spore had the characters of *F. herbarum*, and from the other end those of *F. avenaceum*. These two forms were quite distinct morphologically and culturally, and there was no intermediate form. When grown in dual culture toxins were produced which caused the two to be antagonistic to one another.

Field studies showed that some agricultural methods, such as cultivation and manuring, change the balance between the number of parasitic and saprophytic species in the soil, decreasing the former and increasing the latter. A study of the conditions under which parasitic species of fungi may become saprophytic may give an opportunity of working out efficient measures for control of the fusaria of wheat and other crops.

Schlehuber (A. M.). **Reaction of varieties and inheritance of resistance to races of leaf-rust, Puccinia rubigo-vera tritici (Eriks.) Carleton in hard red winter Wheat.**—*Z. PflZücht.*, 29, 2, pp. 193–208, 1950. [German summary.]

In co-operative investigations of the Oklahoma Agricultural Experiment Station and the Division of Cereal Crops and Diseases, United States Department of Agriculture, 60 wheat varieties and strains were tested in the greenhouse for seedling reaction to the eight races of leaf [brown] rust (*Puccinia rubigo-vera tritici*) [*P. triticina*: *R.A.M.*, 28, p. 516] prevalent in Oklahoma, namely, 2, 5, 6, 9, 12, 21, 45, and 65. The differential varieties Malakof, Webster, Loros, Mediterranean, and Democrat were used. No strain was resistant to all eight races and none to race 21. One strain only, Comanche × Blackhull-Hard Federation (Woodward 44h 2–187), was resistant to five (2, 5, 9 (very resistant), 12, and 45). Blackhull-Oro × Pawnee (C.I. 12516), Westar (very resistant), Austin [ibid., 30, p. 220], and Comanche × Cheyenne-Blackhull (Wd. 43h 3–67) were each resistant to four races. Five strains exhibited resistance to three races, 12 to two, and eight to one.

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Mature plant, field reactions of 54 wheat varieties and strains to natural brown rust infection were tested from 1946 to 1949 at Stillwater. The most resistant was the new variety Hard Federation hybrid (C.I. 12515) with an average infection of 2·8 per cent., followed by Quanah (C.I. 12145) 4·8, Mediterranean-Hope × Pawnee (C.I. 12141) 6·5, Comanche × Blackhull-Hard Federation (C.I. 12517) 6·8, Oro × Mediterranean-Hope (C.I. 12140) 7·5, and Blackhull-Oro × Pawnee 7·7.

In 1947 and 1948 inheritance of reaction to races 9, 12, and 45 in certain crosses of winter wheat were studied under greenhouse conditions. The segregation in the F_2 and F_3 for resistance and susceptibility to race 9 indicated a single recessive gene pair in the following crosses: (Mediterranean-Hope × Pawnee) × Comanche, (Oro × Mediterranean-Hope) × Comanche, (Kawvale-Marquillo × Kawvale-Tenmarq) × Cheyenne, and (Kawvale-Marquillo × Kawvale-Tenmarq) × Comanche. No conclusive evidence was obtained of resistance to races 12 and 45. All selections of the cross studied were completely susceptible to both races in the F_3.

Garbowski (L.). **Wrażliwość niektórych odmian Pszenicy jarej na rdzę źdźbłową, Puccinia graminis tritici (Pers.) Er. et Henn. w stadium kłosa.** [Susceptibility of certain spring Wheat varieties to stem rust, *Puccinia graminis tritici* (*Pers.*) Erikss. & Henn., in the spike stage.]—*Mém. Inst. polon. Écon. rur.*, 19, pp. 301–320, 1949. [English summary. Received July, 1951.]

A tabulated account is given of the reactions of ten spring wheat varieties tested at the Polish Institute of Rural Economy, Warsaw, with a mixed inoculum consisting of *Puccinia graminis*, *P. triticina*, and other micro-organisms. The straw of the varieties Puławska Twarda, Sieburczyńska Gólka, Kalinowiecka, Janetzki, and Heines Kolben was scarcely damaged by *Puccinia graminis*. The seed weight of the varieties (excluding Kalinowiecka) was reduced by 9·3 to 24·5 per cent. In the seedling stage the above-mentioned varieties are susceptible to physiologic races 21 and 40 of *P. graminis* [*R.A.M.*, 18, p. 662]. Kalinowiecka sustained moderate and the other four varieties slight injury from *P. triticina*.

The Ostka Chłopicka, Ostka Jara Puławska, Ostka Hildebranda, and S. 30 Hildebranda varieties suffered little damage from stem rust in the spike stage, and their seed weight was undiminished, except in the case of Ostka Jara Puławska, the 10 per cent. reduction in which may have been due to severe infection by *P. triticina*. This group of varieties is resistant in the seedling stage to *P. graminis*, except for S. 30 Hildebranda, which is fairly resistant to race 21 and susceptible to 40. Ordynatka, which is resistant in the seedling stage to both races of *P. graminis*, was subject to heavy attacks at maturity but its seed weight was not reduced. It was also fairly susceptible to *P. triticina*.

Strazhemskaya (Mme Y.). Образование микоризы у хлебных злаков. [Formation of mycorrhiza in cereals.]—Микробиология [*Microbiology*], 20, 2, pp. 120–121, 2 figs., 1951.

In studies at the State Scientific Institute of Agriculture, Puławy, Poland, it was found that the formation of mycorrhiza on oats [*R.A.M.*, 29, p. 273] does not depend on the character of the soil or on the pH (observed over the range of pH 5 to 8) but on the growth of the plant. Usually the whole root system is infected and the mycorrhiza are typically endotrophic. Oat roots without mycorrhiza are considerably more extensive but deformed.

Meehan (Frances L.). **Helminthosporium victoriae and other graminicolous species.**—*Iowa St. Coll. J. Sci.*, 25, 2, p. 292–294, 1951.

This is a summary of the available information concerning investigations on *Helminthosporium victoriae* on oats in Iowa [*R.A.M.*, 30, pp. 32, 103, 311], all of which has already been noticed [ibid., 26, p. 99; 27, p. 16].

Zhukova (Mme I. A.). Об условиях заражения озимой Ржи грибом **Urocystis occulta (Wallroth) Rabenhorst.** [Concerning the conditions of infection of winter Rye by the fungus *Urocystis occulta* (Wallroth) Rabenhorst.]—Микробиология [*Microbiology*], 20, 2, pp. 152–154, 1951.

In studies at the Alexandrian State Selection Station, U.S.S.R., it was found that the conditions most suitable for the infection of rye by *Urocystis occulta* [*R.A.M.*, 27, p. 11] are 13° to 20° C. and moderate soil humidity. Such conditions usually occur in the central regions of the country during the early sowing period (20th to 26th August). Temperatures of 6° to 10° and increased soil moisture, observed during the late sowing period, limit the development of the disease. *U. occulta* can live in the soil only for a short period; thus the seeds appear to be the sole source of contamination. To control this disease seeds should be treated with the preparations AB or NIUIF–2 [ibid., 20, p. 296].

Wallin (J. R.). **An epiphytotic of Corn rust in the north central region of the United States.**—*Plant Dis. Reptr*, 35, 4, pp. 207–211, 2 graphs, 1951. [Multilithed.]

In this summary of reports from 10 States on the incidence of *Puccinia sorghi* [*R.A.M.*, 30, p. 152] on maize in 1950 the estimated losses are reported to amount to more than 20,000,000 bushels in five States.

Meiffren (M.). **Maize rust disease in Dahomey.**—Typewritten translation (4 pp.) from *Bull. Rech. agron., Bingeville*, 1, 1950.

Considerable damage has recently been caused to maize, especially young, white maize, in Dahomey, the Gold Coast, Nigeria, and the Ivory Coast by a disease which imparts to the fields a characteristically burnt appearance. The leaves are dried up, and the plants become attacked by numerous fungal and animal parasites. In some cobs the grains fail to mature. At the start of the attack the green leaves bear orange uredosori of *Puccinia sorghi* [cf. *R.A.M.*, 25, pp. 154, 253; 28, p. 408; 29, p. 20], which are often so numerous as to make the leaves appear entirely brown. In the Ivory Coast maize stalks were found with the leaves severely rusted, though the cobs were fully ripe. In Dahomey typically dried-up leaves showed no sign of rust, but bore small, grey, often coalescent spots, sometimes clearly edged with brown, with the *Helminthosporium* state of *Cochliobolus heterostrophus* [cf. ibid., 27, p. 355]. Finally, from parts of the stalk slightly above the neck, discoloured rosy-yellow, *Fusarium moniliforme* [*Gibberella fujikuroi*: cf. ibid., 7, pp. 231, 711; 12, p. 552; 26, p. 331] was isolated. The alternate host of *P. sorghi* in West Africa is *Oxalis corniculata*, but it is not present in the maize fields in Dahomey and the aecidial state has not been found in the Ivory Coast. Seed disinfection is recommended against *C. heterostrophus* and *G. fujikuroi*. It is hoped to introduce a suitable resistant variety from the United States or Europe, and meantime selection trials in the field are in progress.

Wallace (G. B.). **Pink ear rot of Maize.**—*Mycol. Circ. Dep. Agric. Tanganyika* 28, 5 pp., [? 1951. Mimeographed.]

This circular reviews the origin of infection, symptoms, control, and toxicity of pink ear rot of maize caused by *Fusarium graminearum* [*Gibberella zeae*: *R.A.M.*, 29, pp. 552, 555, 556], which was unusually widespread and destructive in the Northern Province, Tanganyika, in 1950. *F. moniliforme* [*G. fujikuroi*: loc. cit. and preceding abstract] and its variety *subglutinans* [C.M.I. map. No. 191] were also concerned in the outbreak. Notes are given on seed storage and the estimation of the field performance of seed ears in plant selection.

McKeen (W. E.). **A Corn root- and stalk-rot complex hitherto known as Gibberella zeae stalk rot.**—Abs. in *Phytopathology*, 41, 1, p. 26, 1951.

In the autumn of 1949, root and stalk rot of maize, hitherto attributed to *Gibberella zeae* [see preceding abstract] because of the pinkish-red discoloration of the infected tissue, was prevalent throughout Ontario, Canada [*R.A.M.*, 29, p. 80]. The disease may reduce the potential yield by between 50 and 60 per cent., and the quality of the grain is also impaired. The inbred LC 19, used extensively in these studies, proved to be completely susceptible. The first indications of infection, which begins when the ears are in the milk stage, are watersoaking of some of the roots and blackening of the lower nodes, frequently also involving the bundles. The next symptoms are a brownish discoloration, watersoaking of the first and sometimes of the second internode above the crown, and sudden shrivelling of the foliage. A pinkish-red discoloration usually travels up the stem slightly behind the brown, watersoaked lesion, and soon the pith is rotted away and the bundles are covered only by mycelium. The first organism present was a white, rod-shaped, Gram-negative, non-acid-fast, motile bacterium, which was closely followed by *Pythium arrhenomanes* [ibid., 22, p. 26] in the brown, watersoaked area and by a *Fusarium* sp. in the reddish zone and on the epidermis of the lesion.

Nemlienko (F. E.). Изучение бактериоза початков Кукурузы. [A study of bacteriosis of Maize cobs.]—Доклады всесоюзной ордена Ленина Академии Сельскохозяйственных Наук имени В. И. Ленина. [*Rep. Lenin Acad. agric. Sci.*], *1951*, 2, pp. 35–40, 1 fig., 1951.

Studies at the Ukrainian Institute of Cereal Agriculture have shown that bacteriosis of maize [C.M.I. map No. 41] in U.S.S.R. is not always caused by *Xanthomonas stewarti*. In test plantings of various varieties only young ears during the period from the beginning of milk to the beginning of wax maturity were affected. Soon after flowering some ears were partially uncovered by artificial methods and it was found that only uncovered grains became infected with the disease. The degree of infection depended on the size of the uncovered area. Insects, especially the corn-bug [*Pyrausta nubilalis*], were found to be the carriers of infection. Infected seeds have a lower rate of germination and the young plants are retarded. This is particularly noticeable at the beginning of growth. Productivity is diminished by 20 per cent. or more. Towards the end of germination a vast majority of infected seeds, both in the laboratory and in the field, become covered by moulds, most frequently *Penicillium* [cf. *R.A.M.*, 21, p. 484; 26, p. 392] and *Fusarium* species. In the field, especially when temperature of the soil is lowered during the germination period, these fungi weaken the young off-shoots, killing a considerable number even before they reach the surface of the soil. A three-year experiment showed that bacteriosis was not carried on to the new growth from the seed, infected either naturally or artificially. Uninfected grains on infected cobs remained perfectly healthy.

Control measures recommended are the removal of the part of the ear where the grains are infected, the selection of ears well covered with sheaths, and dusting at the beginning of milk maturity with DDT.

Ciccarone (A.) & Malaguti (G.). **Prime prove di campo e di laboratorio per la lotta contro Sphacelotheca sorghi (Lk.) Clint. e per la conoscenza della sua biologia in Venezuela.** [Preliminary field and laboratory experiments on the control of *Sphacelotheca sorghi* (Link) Clint. and for the knowledge of its biology in Venezuela.]—*Riv. Agric. subtrop. trop.*, 44, 7–9, pp. 145–177, 5 graphs, 1950. [English summary. Received May, 1951.]

Laboratory and field tests were carried out near Maracay and Chirgua, Vene-

zuela, from November, 1947, to April, 1949, on sorghum affected by *Sphacelotheca sorghi* [C.M.I. map No. 220], which may cause crop losses of about 30 per cent. Infection was more severe in spring during the dry season than during and after the wet season. Dried chlamydospores remained viable in the laboratory for nearly a year, and for more than seven months in soil in the field. When smutted stalks and inflorescences were left heaped up in the field for seven months the chlamydospores still induced infection amounting to about 25 to 40 per cent. At harvest the pathogen was still viable in the stubble, but the most severely affected plants did not shoot again. Where a ratoon crop was induced infection was heavier than before.

Of 26 varieties tested, locally grown strains of feterita, Schrock, and milo sorghum were more severely attacked by *S. sorghi* than other lines of these varieties obtained from different localities. Milo Martin Combine, White Kafir, Brown Corn Schorbourch, Early Hegari Arizona, Early Hegari Texas, Kafir Black Hull, Kafir Schrock Improved, and Milo Plainzman Combine Texas remained free from *S. sorghi*; Feterita Genetica, Sangrani, Milo Dwarf, Milo Sooner Texas, Milo D.D.N. No. 38 Arizona, Brown Corn Illinois, and Milo Caprock Combine Arizona sustained less than 2 per cent. infection. The last-named and White Kafir, Kafir Black Hull, and Kafir Schrock Improved were only moderately affected by cercosporiosis (*Cercospora sorghi* [*R.A.M.*, p. 29, 615] and *Gloeocercospora sorghi* [ibid., 29, p. 97]), while these four varieties and Feterita Genetica, Sangrani, Milo Plainzman Combine Texas, and Milo Sooner Texas sustained only slight damage from helminthosporiosis [*Helminthosporium* spp.].

Seed treatment [ibid., 29, pp. 202, 250; 30, pp. 266, 317] with arasan S.F., N.I. granosan, and spergon gave excellent control of the disease, spergon at about a quarter of the usual dose.

Couranjou (A.). **Échec à la psorose.** [A check to psorosis.]—*Fruits & Primeurs*, 21, 221, pp. 2–5, 7 figs., 1951.

The author recapitulates the history and symptoms of citrus psorosis virus disease and the results of researches made up to the present on its cause and control. As it appeared that only trees suffering from nutrient deficiency were attacked in North Africa [*R.A.M.*, 29, p. 97], various corrective remedies were applied. Results showed that liquid potassium permanganate applied to the soil around the roots three times a year for four years at the rate of 3 kg. per tree resulted in a complete and permanent cure. Owing to the cost of this material, however, further experiments were made with a cheaper nitrous colouring agent, trucidor (a polynitrocycloaralcoyloxybenzene). In September, 1945, 500 gm. were scattered over the root zone at the foot of a tree considered to be beyond hope of recovery. The topsoil was watered lightly. The following spring the tree was in full leaf. There was a slight return of the disease in 1949, but following the application of a further 500 gm. the tree appeared to have recovered completely. Similar results were obtained with two severely affected orange trees each treated with 2 kg. trucidor, while a neighbouring untreated tree was ravaged by the disease.

In May, 1950, 411 badly affected 18-year-old Thompson Navel orange trees were each treated with 500 gm. trucidor. By November, 90 per cent. of the trees were completely cured, some evidence of psorosis still remaining on those most severely affected.

Similar experiments are envisaged in the control of gummosis and quick decline.

Wallace (J. M.) & Drake (R. J.). **Newly discovered symptoms of quick decline and related diseases.**—*Calif. Citrogr.*, 36, 4, pp. 136, 168–169, 2 figs., 1951.

After the receipt of a report that quick decline was present in citrus trees in the Gold Coast and that the same virus was probably the cause of vein-clearing of the

leaves of West Indian or Mexican lime seedlings, large numbers of West Indian lime seedlings were inoculated at the University of California Citrus Experiment Station by means of tissue grafts from trees affected by quick decline in southern California [*R.A.M.*, 30, p. 518]. At the same time the seedlings were decapitated to stimulate new leaf growth from the axillary buds. In many cases the first leaves to develop were small, chlorotic, and slightly cupped, becoming mottled and frequently showing slight vein-clearing. Further inoculations showed these symptoms to be distinct from those of the psorosis virus. Lime seedlings inoculated by means of tissue grafts from several symptomless and apparently virus-free citrus sources failed to reveal the presence of any latent or undetected viruses in them. *Aphis gossypii* [loc. cit. and next abstract] transmitted from diseased to healthy limes a disease having symptoms identical with those obtained by tissue grafting. Transfers from lime seedlings infected either by grafts or by the aphid to sweet orange on sour rootstock trees produced typical quick decline symptoms. From these and other studies it is concluded that lime seedlings inoculated with quick decline virus develop foliage symptoms which are diagnostic, thus providing a rapid indicator test plant [ibid., 29, p. 412] of particular value in insect vector studies. If the bark is stripped off infected seedlings numerous small pits or longitudinal depressions are found, similar to those described for the lime disease in the Gold Coast [ibid., 29, p. 97].

Dickson (R. C.), Flock (R. A.), & Johnson (M. M.). **An insect vector of the Citrus quick decline disease.**—*Calif. Citrogr.*, 36, 4, pp. 135, 169-170, 2 figs., 1951.

The information in this paper on the transmission of citrus quick decline virus by *Aphis gossypii* [see preceding abstract] has already been noticed from other sources [*R.A.M.*, 30, p. 518].

Kiely (T. B.). **Control and epiphytology of black spot of Citrus on the central coast of New South Wales.**—*Sci. Bull. Dep. Agric. N.S.W.* 71, 88 pp., 1 pl., 6 graphs, 1950. [Received July, 1951.]

This is a full account of the programme recommended for the control of citrus black spot (*Guignardia citricarpa*) [*R.A.M.*, 29, p. 208] on Valencia oranges based on spraying experiments in the central coast areas of New South Wales from 1938 to 1948, the salient points of which have been already noticed from another source [ibid., 28, p. 454]. A full statistical analysis of results is given. A positive correlation was found to exist between disease development and rainfall during the susceptible period, and a negative one between disease development and the period after petal fall when infection occurred. Mean maximum temperatures between 75° and 77° F. at the time of fruit development are necessary for the disease, which reaches a maximum when the optimum temperature coincides with peak of maturity. Once re-greening of the rind has started little or no further black spot develops.

Chowdhury (S.) & Dutt (S.). **Vein-splitting, a boron deficiency disease of Citrus in Assam.**—*Sci. & Cult.*, 15, pp. 358–359, 1 fig., 1950.

After five years in the orchard at the Citrus Fruit Research Station, Burnihat, Assam, the leaves of sour orange and shaddock developed enlargement, corking, and splitting of the midrib and veins [*R.A.M.*, 23, p. 259]. The laminae tended to curl downwards towards the midrib, were lustreless and slightly yellowish, brown, or bronzed, and corky and brittle on the surface. Khasi orange (*Citrus reticulata*), citron, Assam lemon, *C. macroptera*, *C. jambhiri*, *C. karna*, and the Karimganj lime (*C. aurantiifolia*) growing side by side with the affected trees remained quite healthy. This is the first report of such symptoms occurring in Assam or in any part of India.

In a preliminary trial with six of the most seriously affected shaddock trees and eight of the sour orange, borax was applied to loosened soil around the trees at the rate of 1 lb. per tree, and for the sour orange only both leaf surfaces were sprayed with a solution of 1 or 2 oz. borax in 3 gals. water, at the rate of 1½ gals. spray per tree. All treatments appeared equally effective in improving the general appearance of the trees. No corking or splitting of the veins and midribs or leaf curling developed on the new growth. Untreated trees showed an intensification of symptoms and a greater number of leaves became affected. The leaves of the trees given 2 lb. boron turned yellowish-orange along the margins and at the tips, probably owing to an excess of boron [ibid., 29, p. 301]. Exhaustive field trials and cultural experiments are in progress.

Dimock (A. W.) & Baker (K. F.). **Effect of climate on disease development, injuriousness, and fungicidal control, as exemplified by Snapdragon rust.**—*Phytopathology*, 41, 6, pp. 536–552, 3 figs., 1951.

In studies covering a four-year period at Cornell University, Ithaca, New York, and the University of California, Los Angeles, the optimum temperature for the completion of the life-cycle of *Puccinia antirrhini* was found to range from 70° to 75° F., whereas uredospore germination and infection were most abundant at 50° to 55° [cf. *R.A.M.*, 18, p. 741; 24, p. 314]. Incubation at 80° resulted in the abortion of a considerable proportion of the 24- to 36-hour-old infections previously established at lower temperatures, and only a few survived incubation at 90°. Protracted exposure to a temperature of 95° and upwards destroyed the uredospores *in situ*.

The intensity of the rust on the Afterglow variety of *Antirrhinum majus* in experimental plots at the two places mentioned above and at Beltsville, Maryland, Urbana, Illinois, and Wooster, Ohio, was in complete agreement with expectations based on temperature and moisture records. At the last three locations the development of the pathogen was prevented or largely restricted by high temperature or insufficient moisture, or both, whereas the more favourable climatic conditions prevailing in California and New York permitted the occurrence of severe infection. Under semi-arid conditions injury to the host resulted almost exclusively from desiccation of the rust-invaded tissues, but where average relative humidity was high and rainfall frequent, damage was caused primarily by such facultative parasites as *Fusarium* spp., which entered through the pustules, destroyed the rust, and advanced into the previously healthy tissues, killing leaves and stems.

Ferbam (fermate) sprays were only moderately effective and Bordeaux mixture apparently useless in control experiments at Los Angeles and Ithaca [ibid., 30, p. 368], where the development of infection was promoted by environmental factors. At Wooster, however, where unfavourably high temperatures affected the pathogen adversely, both materials conferred excellent protection. At all locations zineb (parzate) at 2 lb. in 100 gals. (1½ in 1949) gave excellent control; 2 per cent. rosin lime-sulphur was good, and wettable sulphur poor. At Ithaca Bordeaux mixture 8–8–100 and copper-8-quinolinolate (bioquin 1) at 1 lb. in 100 gals. effectively combated secondary fungi, principally *F.* '*roseum*' and *F. tricinctum* [ibid., 25, p. 366], which were highly destructive in the untreated plots. In the dry atmosphere of Los Angeles the Bordeaux-sprayed plants suffered severely from desiccation of the rusted tissues, but in the humid climate of Ithaca the appearance of the plants treated with Bordeaux and bioquin 1 was relatively normal and they flowered profusely.

Boothroyd (C. W.). **A new leaf spot of Celastrus scandens L., the climbing Bittersweet.**—*Mycologia*, 43, 3, pp. 373–375, 1 fig., 1951.

A typical *Marssonina* of the anthracnose group was common on the leaves of the

ornamental *Celastrus scandens* near Ithaca, New York, in 1948 and 1949. It closely resembled *M. thomasiana* on *Euonymus atropurpurea*, but inoculation of seedlings of both hosts with the new fungus resulted in heavy spotting on the former, while the latter remained healthy.

Thomas (W. D.) & Baker (R. R.). **The Carnation as a carrier of wilt-producing Fusaria.**—Abs. in *J. Colo.-Wyo. Acad. Sci.*, 4, 2, pp. 60–61, 1950.

In investigations at the Colorado A and M College isolations were made from 1,790 apparently healthy carnations of 20 varieties. *Fusarium* sp. was obtained from 107 (6 per cent.) of the plants. From the Virginia variety *Fusarium* constituted 81 per cent. of the isolates. It was also very prevalent in White Patrician, Pink Patrician, Starlight, and Northland, but was not isolated from Flesh Pink Patrician, Light Pink Patrician, Louise, and Sylvia. No symptoms were apparent on the mother plants even four months after the isolations had been made, though numerous cuttings from the *Fusarium*-carrying plants died as a result of infection. *F. oxysporum* f. *dianthi* [*F. dianthi*: *R.A.M.*, 29, p. 606] was twice as prevalent as *F. culmorum* [loc. cit.; see also ibid., 25, p. 344; 28, p. 334]. When ten isolates obtained from this experiment were introduced as spore suspensions into replicated series of *Fusarium*-free White Patrician carnation plants highly significant differences in pathogenicity were observed.

Baker (R. R.) & Thomas (W. D.). **Root transmission of the Carnation mosaic virus.**—Abs. in *J. Colo.-Wyo. Acad. Sci.*, 4, 2, p. 60, 1950.

In root transmission tests at Colorado A and M College with carnation mosaic virus [cf. *R.A.M.*, 30, p. 468] a virus-free carnation plant and a virus-free *Dianthus barbatus* indicator were grown side by side in sterilized soil in one pot. Eighteen such carnation plants were inoculated by abrasion with virus extract. In three separate experiments mosaic symptoms developed in 58, 72, and 100 per cent. of the [indicator] plants, respectively, the last result being obtained on plants in insect-proof cages. No evidence of insects or of insect feeding was found at the conclusion of the experiment.

Beaumont (A.). **Diseases of Sweet Williams.**—*Gdnrs' Chron.*, Ser. 3, 130, 3371, p. 63, 1951.

Of the diseases affecting sweet williams [*Dianthus barbatus*] in England, rust (*Puccinia arenariae*) [cf. *R.A.M.*, 28, p. 510] is common in most seasons, particularly in the south where it is often severe. Varieties with dark red flowers and reddish-green leaves are fairly resistant. The plants should be well spaced out and planted in rather poor soil. Spraying with Bordeaux mixture or any other copper fungicide is recommended for the control of leaf spot caused by *Ascochyta dianthi* [cf. ibid., 7, p. 11], which is also common in the south of England. *Heterosporium echinulatum* [*Didymellina dianthi*: ibid., 16, p. 255 and above, p. 560] occurs frequently in most parts of Britain. Since the spores are not easily killed, control by copper sprays is more difficult than with *A. dianthi*.

Beaumont (A.). **Diseases of bulbous Irises.**—*Gdnrs' Chron.*, Ser. 3, 130, 3372, pp. 73–74, 1951.

Of the diseases affecting bulbous irises in England [*R.A.M.*, 21, p. 81], ink disease (*Mystrosporium adustum*) [ibid., 28, p. 576; 29, p. 222], stripe or mosaic [iris mosaic virus: ibid., 16, p. 728], and leaf spot caused by *Heterosporium gracile* [*Didymellina macrospora*: ibid., 26, p. 108; cf. 30, p. 369] are particularly common and severe. Stored bulbs are subject to rotting by *Penicillium* sp. Ink disease was discovered on *Lachenalia* as well as *Montbretia* [*Tritonia*] a few years ago. The spots normally appear on the leaves in May and June, but may develop in February or March in the Scilly Isles. In favourable weather conditions leaf spot may spread

on an epidemic scale; in south-west England whole fields may be brown before the flowers have been picked. The disease has been observed only once on *Iris tingitana*. Later varieties, especially Yellow Queen and Cajanus, may suffer severely. As with ink disease the bulbs should be lifted at the end of the season [ibid., 10, pp. 434, 462].

Severin (H. H. P.) & Tompkins (C. M.). **Aphid transmission of severe mosaic virus of Annual Stock.**—*Hilgardia*, 20, 6, pp. 93–108, 4 pl., 1950. [Received June, 1951.]

At the California Agricultural Experiment Station, Berkeley, the first symptom of severe mosaic virus found on the youngest leaves of annual stock (*Matthiola incana* var. *annua*) [*R.A.M.*, 18, p. 459] was cleared venation accompanied by downward bending of the stem apex. Later the veins protrude on the lower surface. A prominent, coarse mottle appears two or three weeks after inoculation. The young leaves are curled, twisted, and puckered and the intermediate leaves may be deformed. In an advanced stage the older leaves show a permanent mottling, sometimes with blister-like elevations. Plants infected shortly after transplanting are sometimes dwarfed. Individual petals show irregular, white areas scattered among normal-coloured blotches, or white streaks encompassing the veins and often spread out on each side of them.

Single, infective, unfasted *Myzus persicae*, *Brevicoryne brassicae*, and *Rhopalosiphum pseudobrassicae* aphids transmitted the virus to 0, 3, and 6 per cent. of the healthy plants, respectively. When they were fasted for two to three hours and given infective feeding periods of up to ten minutes the transmission figures were 42 per cent. for *M. persicae* and 12 per cent. for *R. pseudobrassicae*. The infection percentage for mechanical transmission was 51·4 compared with an average of 46·7 for lots of 20 aphids. The virus was transmitted by aphids during the first day but not subsequently. In hourly transfers one lot of 20 *M. persicae* transmitted the virus during the first two hours, eight lots during the first hour only, and one during the second hour only. *R. pseudobrassicae* transmitted during the first hour only. The virus is non-persistent in the vectors.

Alvarez García (L. A.) & Diaz (M. A.). **Aspergillus root-stalk rot of Sansevieria (Sansevieria laurentii, Wildem.)**—*J. Agric., P. R.*, 33, 1, pp. 45–53, 1 graph, 1949 (issued 1950).

The export of cuttings of the ornamental *Sansevieria laurentii* (a bud variation of *S. zeylanica*) from Puerto Rico to the United States is hampered by a serious rot, caused by *Aspergillus niger* [*R.A.M.*, 29, p. 630], which advances up the stems into the petioles. The fungus is favoured by the warm, moist conditions prevailing in transit; it seems to enter only through wounds. Dusting with spergon or semesan jr. and dipping the cuttings for three minutes in a 1 in 1000 mercuric chloride solution, followed by thorough washing, gave complete control; 20,000 slips treated with spergon dust in January, 1946, before shipment were free from rot on arrival in New York.

Tompkins (C. M.). **Pythium rot of pink and yellow Calla corms and its control.**—*Hilgardia*, 20, 10, pp. 183–190, 3 pl., 1950.

In the Santa Cruz region of California pink and yellow calla (*Zantedeschia rehmannii* and *Z. elliottiana*) corms are frequently infected with a rot at harvest and in storage caused by *Pythium ultimum* [cf. *R.A.M.*, 28, p. 397]. External symptoms consist of small to large, shallow, watersoaked lesions which destroy the skin of the corm. Old lesions become dry, dark brown to black, and slightly sunken. Internally small to large, watersoaked, light grey lesions develop. Infected corms may be partially or completely rotted within a short period. The disease is favoured

by relatively high air humidity, moisture in the soil particles adhering to the skin and wounded areas after harvest, and temperatures of 50° F. or more in storage. The pathogenicity of *P. ultimum*, which is a wound parasite, was confirmed in laboratory tests. Control measures include the avoidance of mechanical injury to the corms during harvest, prompt cleaning, excision of infected tissue, dusting of all cut and exposed surfaces with a mixture composed of spergon and celite 505 (a diatomaceous earth which absorbs moisture and accelerates suberization), and storing in well-ventilated bulb trays under cool conditions.

Tompkins (C. M.) & Severin (H. H. P.). **Spotted wilt of white, yellow, and pink Callas.**—*Hilgardia*, 20, 12, pp. 207–218, 14 pl., 1950. [Received June, 1951.]

Tomato spotted wilt virus causes a destructive disease in field plantings of the white, yellow, and pink calla (*Zantedeschia aethiopica* [*R.A.M.*, 28, p. 175], *Z. elliottiana*, and *Z. rehmannii*) in the north of the San Francisco Peninsula and in the Monterey Bay region of California. The symptoms, which are fully described [ibid., 14, p. 366], are similar on the three species, being most severe on the pink. Infection was noted also in *Arum palaestinum*, *Z. albo-maculata*, and *Z. melanoleuca*.

Using powdered carborundum as an abrasive, the virus, obtained from field-grown, infected white callas, was transmitted to healthy white, yellow, and pink calla seedlings in the greenhouse at air temperatures ranging from 13° to 19° C. Most of the seedlings became infected systemically in 10 to 34 days. Perpetuation of the virus in vegetative organs was demonstrated experimentally by pot culture of offsets of infected stock. No seed transmission was detected in thousands of seedlings observed. Control is hampered by the obstacle of natural contamination from other calla plantings and from other infected ornamentals in the vicinity. It is suggested that healthy stocks of calla rhizomes and corms could be propagated from seed in isolated coastal valleys and there kept reasonably free from spotted wilt, roguing being practised to advantage.

Rowell (J. B.). **Observations on the pathogenicity of Rhizoctonia solani on Bent Grasses.**—*Plant Dis. Reptr*, 35, 5, pp. 240–242, 1951. [Multilithed.]

In studies on brown patch (*Rhizoctonia* [*Corticium*] *solani*) turf disease [*R.A.M.*, 12, p. 450; 25, p. 397; 29, p. 86] at Rhode Island Agricultural Experiment Station sections from established four-year-old sod of Congressional creeping bent grass (*Agrostis palustris*) [cf. ibid., 30, p. 507], grown in the greenhouse, and young turf of Colonial bent grass (*A. tenuis*) grown from seed in steam-sterilized soil in pots were sprayed with a mycelial suspension of *C. solani*. The strain used was isolated from brown patch on Colonial bent in Rhode Island in 1947. The plants were maintained in a moisture chamber at 75° to 85° F. for 48 hours. Repeated inoculation trials failed to produce typical infection on uncut grass, but on turf of both types cut short severe symptoms resulted in 18 hours. The turf was allowed to recover by growing it at 65° to 70°, being cut at weekly intervals. Three weeks later sods of each type were halved, the grass of one half being cut to ½ in. height, while the other was left uncut, with leaves 2 to 3 in. long. Inoculations were again made: severe brown patch developed on all the cut grass, but only spotty infection on the uncut. In a similar inoculation experiment on young Colonial bent seedlings grown in steam-sterilized soil in pots severe infection was obtained on cut leaves and only sparse on the uncut.

Guttation drops appear to be a second important factor [cf. ibid., 23, p. 270], as they contribute to the saprophytic growth of the pathogen. All severe brown patch infections observed occurred when the turf was moist with these drops, though the disease was not observed to develop during rain. The known protective effect of poling and hosing the greens early in the morning can be explained by the resultant dispersion and subsequent rapid drying of the moisture and nutrients of

these drops and the mechanical damage to the germinating sclerotia. Excessive guttation may complicate fungicidal control. Preliminary laboratory studies showed that some fungicides are inactivated in various degrees by glutathione. The phenyl mercury compounds were most markedly affected, indicating that metabolites with sulphhydryl groups in guttation water may influence the field performance of these materials.

Isakova (Mme A. A.) & Aniskina (Mme Z. N.). Микробиологические процессы в ризосфере и бактериризе многолетних трав и способы управления этими процессами. [Microbiological processes in the rhizosphere and bacteriorrhiza of perennial grasses and means of regulating these processes.]—Советск. Агрон. [*Sovetsk. Agron.*], *1950*, 12, pp. 35–43, 1950.

In studies at the Institute of Grain Farming in the non-black soil district of the U.S.S.R. it was found that the intensity of microbiological action in the root zone of perennial grasses, such as couch grass (*Agropyron intermedium* and *A. elongatum*), timothy [*Poa pratensis*], and fescue [*Festuca* sp.], ceases after different periods. In couch grass the active microflora persists for up to five years, in timothy and fescue a distinct reduction occurs in the third year. Various groups of micro-organisms prevail in the rhizosphere during the period of spring growth, those converting organic nitrogen predominating in fescue; in timothy and during the flowering period of the other grasses those mobilizing nitrates are dominant. A mixed sowing of beans and grass activates the microbiological life in the root zone of both components. Aerobic and anaerobic decomposition of root remains takes place intensively at 5° to 7° C., if a source of nitrogen is present.

Padfield (C. A. S.). **Superficial scald on New Zealand Granny Smith Apples—the period of greatest susceptibility.**—*N.Z. J. Sci. Tech.*, Sect. A, 32, 3, pp. 45–47, 1950. [Received June, 1951.]

The results of a series of wrapping periods of three weeks' duration (using commercial oiled wrappers with not less than 15 per cent. mineral oil by weight) applied to Granny Smith apples in 1942 and 1943 during the first 24 weeks of cool storage (33° to 34° F.) showed that susceptibility to scald [*R.A.M.*, 28, p. 377; 30, p. 508] increased from the first to the 12th week and decreased thereafter until the 24th.

Clayton (C. N.). **Botrytis leaf spot of Apple in North Carolina.**—*Plant Dis. Reptr*, 35, 5, p. 237, 1 fig., 1951. [Multilithed.]

A necrotic blotch or spot of apple leaves very common in many orchards in Wilkes and Alexander counties, North Carolina, in May, 1950, was caused by a species of *Botrytis*. Inoculations of mature detached leaves resulted in the development of large necrotic blotches from which the fungus was re-isolated. In sprayed orchards incidence was 2·4 to 3·6 per cent. compared with 7·5 in unsprayed.

KenKnight (G.), Bruer (H. L.), & Shepard (C. E.). **Occurrence of phony disease in wild Plum thickets distant from Peach orchards in Spartanburg County, South Carolina.**—*Plant Dis. Reptr*, 35, 4, pp. 183–185, 1951. [Multilithed.]

Chemical tests by Hutchins's method [*R.A.M.*, 13, p. 38] on peach trees grafted with root pieces of wild *Prunus* in South Carolina indicated that phony peach virus [ibid., 30, p. 143 and next abstract] is endemic in *Prunus angustifolia* [ibid., 29, pp. 34, 104] in Spartanburg county where the tree is common.

Cochran (L. C.), Weinberger (J. H.), & Turner (W. F.). **Natural occurrence of the phony virus in wild Chickasaw Plums near Peach orchards in Georgia.**—*Plant Dis. Reptr*, 35, 4, pp. 181–182, 1951. [Multilithed.]

Root grafting tests of wild plum trees in Macon, Peach, Crawford, and Houston

counties, Georgia, indicated that wild chickasaw plum trees (*Prunus angustifolia*) adjacent to peach orchards where phony peach virus [see preceding abstract] is present are commonly naturally infected and probably serve as a hold-over reservoir from which new orchards may acquire the virus. Infected plum trees growing in fence-rows or thickets under variable conditions of crowding, fertility level, and soil types do not develop characteristic recognizable virus symptoms.

Stout (G. L.). **Peach mosaic.**—*Bull. Dep. Agric. Calif.*, 40, 2, pp. 43–45, 1 col. pl., 1951.

Descriptions are given of the variety of symptoms caused by peach mosaic virus on peach and nectarine in California [*R.A.M.*, 19, p. 227; 29, p. 500].

Schlocker (A.) & Nyland (G.). **Yellow leaf roll of Peach.**—*Bull. Dep. Agric. Calif.*, 40, 2, pp. 39–42, 2 col. pl., 1951.

This information on yellow leaf roll of peach in California has already been noticed from another source [*R.A.M.*, 30, p. 375].

Simonds (A. O.). **Transmission of Apricot ring pox to Peaches and Plums.**—*Plant Dis. Reptr*, 35, 4, pp. 189–190, 1951. [Multilithed.]

Bud-grafting experiments carried out in Colorado from 1946 to 1950 showed that the Moorpark, Montgamet, Jones, Early Horn, Chinese, Reece, and Oliver apricot varieties express symptoms of the ring pox virus disease [*R.A.M.*, 21, p. 339; 23, p. 391]. The apricot variety Royal, a number of plums, and the peach varieties J. H. Hale, Elberta, Hale Haven, Orange Cling, and Indian Blood Cling can act as symptomless carriers.

Novák (J. B.). **Opadávání mladých Meruňkových plodů.** [Dropping of young Apricot fruits.]—*Ochr. Rost.*, 23, 4, pp. 352–354, 4 figs., 1950. [Russian and English summaries.]

Preliminary investigations into the dropping of young apricot fruits in Czechoslovakia in 1949 and 1950 demonstrated that the cause was most commonly *Botrytis cinerea* [*R.A.M.*, 26, p. 344] and *Sclerotinia sclerotiorum* (first record for the country on this host) [ibid., 15, p. 235; cf. 29, p. 313]. Species of *Fusarium* and *Alternaria* were present less frequently.

Fink (H. C.). **Detection of necrotic ring spot virus and its occurrence and spread in Sour Cherry nurseries.**—*Iowa St. Coll. J. Sci.*, 25, 2, pp. 211–213, 1951.

In this summary of a Doctoral thesis it is reported that in preliminary experiments at Iowa State College, *Prunus tomentosa* proved more reliable than Elberta peach in the field and as reliable as Montmorency cherry in the greenhouse as an indicator for necrotic ring spot virus [*R.A.M.*, 30, p. 477]. Of 17 varieties of plum, five of ornamental *Prunus* spp., one of apricot, and six of cherry indexed in nurseries in south-west Iowa (496 trees), 27 species and varieties contained the virus, infection averaging 37 per cent. Early Richmond [cherry: ibid., 30, p. 312] was 100 per cent. infected. Two samples of wild black cherry and two of wild plum growing near the nurseries were also infected. The data indicate the need for growing virus-free cherry nursery stock in isolation and that wild plum rootstocks may act as sources of virus infection for cultivated plum.

Of 161 *P. mahaleb* trees in a seed orchard near Gustine, California, 25 budwood samples from Zillah, Washington, and three field samples of seedlings, 7, 85, and 14 to 35 per cent., respectively, were infected. A further experiment indicated that isolation of sour cherry fields by $\frac{1}{4}$ mile from other *Prunus* spp. may help to prevent their becoming infected.

Wilhelm (S.), Thomas (H. E.), & Koch (E. C.). **Diseases of the Loganberry.**—*Calif. Agric.*, 5, 1, pp. 11, 14, 3 figs., 1951.

Immune from the wilt caused by *Verticillium* [*albo-atrum*: *R.A.M.*, 30, p. 332] and from powdery mildew [*Sphaerotheca humuli*: cf. ibid., 24, p. 423], loganberries sustain heavy damage in California from the [blackberry] dwarf virus [ibid., 30, p. 377], which leads to complete sterility after two or three years; the thorny varieties are chiefly affected. Calico or yellow blotch mosaic virus [cf. ibid., 17, p. 537] is also widespread (up to 100 per cent.) in old plantings, but causes no serious injury where irrigation is practised. These diseases also attack the native Pacific Coast blackberry [*Rubus procerus*], proximity to which should therefore be avoided in the establishment of new plantings. *Septoria rubi* [cf. ibid., 29, p. 571], which assumes a severe form nearly every year in the high-rainfall area of Santa Cruz County, may be effectively combated by two applications of dithane Z-78 or parzate (2 lb. per 100 gals. water), the first in March when the new laterals are leafing out, and the second in April, just as the flowers begin to open. The very damaging orange rust (*Gymnoconia interstitialis*) [ibid., 24, p. 423], is not amenable to control by spraying, and diseased plants should be promptly destroyed.

Roach (F. W.). **Strawberry varieties.**—*Gdnrs' Chron.*, Ser. 3, 130, 3368, pp. 32–33, 1951.

When first distributed, the Auchincruive Climax strawberry variety [cf. *R.A.M.*, 28, p. 528; 29, p. 199] was virtually virus-free [cf. ibid., 27, p. 140], and it still shows considerable resistance to virus troubles, but if planted near an affected variety resistance breaks down. This also applies to Huxley Giant.

Miller (P. W.). **Studies on the mechanical transmission of Strawberry yellows.**—*Plant Dis. Reptr*, 35, 4, pp. 179–180, 1951. [Multilithed.]

Few virus diseases of rosaceous plants have been transmitted mechanically other than by grafting. In experiments at Corvallis, Oregon, when M/100 sodium sulphite was added to expressed leaf juice from Marshall plants infected with strawberry yellows [yellow edge] virus [*R.A.M.*, 30, p. 523] and the mixture used to inoculate East Malling strain healthy plants [ibid., p. 508], two out of 32 were infected. The failure to transmit the virus mechanically with regularity is believed to be due to properties of the host as well as to those of the virus. In extracted leaf juice both normal and virus proteins are believed to be brought into contact with certain protein precipitants which are liberated during maceration of the leaves. These are probably present in such large quantities that after withdrawal of the leaf proteins the aqueous extracts still contain sufficient amounts of the precipitants to precipitate nearly all the virus.

Butler (E.) & King (T. H.). **Strawberry root-rot in Minnesota.**—*Plant Dis. Reptr*, 35, 5, pp. 238–239, 1951. [Multilithed.]

Of numerous fungi isolated from strawberry plants affected by black root rot in Minnesota [cf. *R.A.M.*, 13, p. 785; 18, p. 809; 26, p. 400; 28, p. 580], *Hainesia* [*Pezizella*] *lythri* [cf. ibid., 14, p. 180; 28, p. 180], *Coniothyrium fuckelii* [*Leptosphaeria coniothyrium*: cf. loc. cit.], and *Rhizoctonia* [*Corticium*] *solani* [cf. ibid., 27, p. 374; 28, p. 21] proved pathogenic, *P. lythri* being the most virulent.

Alvarez García (L. A.). **Anthracnose of the Annonaceae in Puerto Rico.**—*J. Agric. P.R.*, 33, 1, pp. 27–42, 8 figs., 1949 (issued 1950).

In the humid central and north-eastern areas of Puerto Rico wild plants of *Annona*, including custard apple (*A. reticulata*), *A. muricata*, *A. glabra*, and *A.*

squamosa, are infected by *Colletotrichum* (*Gloeosporium*) *gloeosporioides* [*Glomerella cingulata*: *R.A.M.*, 20, p. 27; 27, p. 245], causing flower and fruit drop, die-back and cankering of twigs and branches, and damping-off of the seedlings. Trees growing under semi-arid conditions escape the disease.

Two biotypes of the fungus were isolated from *A. muricata*, one being dark olivaceous and the other white on potato dextrose agar. They varied greatly in their morphological characters, but caused typical anthracnose of the various Annonaceae. In greenhouse experiments inoculated plants developed symptoms in moist chambers (60 to 80 per cent. relative humidity) within three to four weeks, but at 40 to 50 per cent. humidity remained free from infection.

Weekly sprayings with 2–100 zerlate, 2–100 fermate, 1–100 phygon, and 4–4–50 Bordeaux mixture kept the disease under control. It is concluded that Annonaceae should be grown commercially only in the dry areas of Puerto Rico.

Adsuar (J.). **Studies on virus diseases of Papaya (Carica papaya) in Puerto Rico. IV. Preliminary studies on the host range of Papaya mosaic.**—*Tech. Pap. P. R. agric. Exp. Sta.* 5, 5 pp., 1950.

In a further paper in this series [cf. *R.A.M.*, 30, p. 279] it is reported that of 49 species of plants representing 21 families tested by carborundum inoculation for reaction to papaw mosaic virus at the University of Puerto Rico Agricultural Experimental Station, only *Melothria guadalupensis* was susceptible and it proved to be a symptomless carrier. The virus could not be recovered two months after inoculation. Papaw seedlings inoculated with sap from a number of local crop plants bearing mosaic symptoms did not develop any infection.

McBeth (C. W.). **Observations on repeated applications of D-D (dichloropropene-dichloropropane).**—*Plant Dis. Reptr*, 35, 5, pp. 243–245, 3 figs., 1951. [Multilithed.]

Applications of DD [*R.A.M.*, 29, p. 558; 30, p. 21] made annually for five years at rates of up to 400 lb. per acre gave no indication that any residue toxic to plant growth accumulated in the soil. Tomato, tobacco, melon, and cowpea plants grown in an area treated with 400 lb. DD each year for five consecutive years were larger and healthier than on adjacent untreated soil.

Adams (R. E.), Pratt (R. M.), & Terry (C. W.). **A leaf punch for sampling foliage for analysis of spray deposits.**—*Phytopathology*, 41, 6, p. 568, 1 fig., 1951.

A sampling method suggested by R. C. Stearns, of the Citrus Experiment Station, Lake Alfred, Florida, was developed in 1949 and 1950 at Cornell University, New York, for the analysis of mist concentrate spray deposits and residues on attached foliage. Each sample, consisting of disks from the requisite number of leaves, is collected in a single vial, from which it is washed with the reagent used to dissolve the residue. For convenience in calculation, a punch was designed to cut disks exactly 3 sq. cm. in area, and a Veeder counter was mounted on the top of the punch and attached to its mechanism. A hard rubber block, $1\frac{1}{2}$ by $1\frac{1}{4}$ by $1\frac{1}{2}$ in., with a hole to accommodate the vial aligned with the discharge hole in the punch, was fixed under the punch. The lever-action punch was supplied by the MacMieth Company, Inc., 44 Hunter Street, Newark, New Jersey.

Gäumann (E.). **Pflanzliche Infektionslehre. Zweite Auflage.** [Principles of plant infection. Second edition.]—681 pp., 267 figs., 24 diags., 169 graphs, 7 maps, Basel, Verlag Birkhauser, 1951. Sw. Fr. 44.50.

For the second edition of this treatise [*R.A.M.*, 29, p. 371] there has been a revision of several sections and various other changes, including the addition of

156 figures and 17 tables, necessitated by renewed access to literature unobtainable in Switzerland during the war.

YARWOOD (C. E.). **Associations of rust and virus infections.**—*Science*, 114, 2953, pp. 127–128, 1 fig., 1951.

In experiments at the University of California, Berkeley, bean plants (*Phaseolus vulgaris*) in the primary leaf stage were inoculated with race 1 of *Uromyces phaseoli* [*U. appendiculatus*: *R.A.M.*, 30, p. 401] by brushing a uredospore suspension on to the lower surface of one half of each leaf and incubating overnight in a moist chamber. Other plant hosts were similarly inoculated with rust pathogens. When bean leaves with well-separated rust pustules were inoculated with tobacco mosaic virus, necrotic rings formed round some of them [cf. ibid., 30, p. 98]. With closely contiguous pustules the virus caused few necrotic lesions and no rings developed. The virus was invasive in such rusted tissue, through which it moved about 1 mm. per day and formed a necrotic ring or margin around the entire rusted area. In virus-infected tissues sporulation was reduced and the tissue died prematurely. Tobacco ring spot, tobacco necrosis, and lucerne mosaic viruses produced symptoms in rusted bean tissues somewhat similar to those of tobacco mosaic virus. With cucumber mosaic virus, which does not usually produce specific local symptoms on bean, circular, necrotic lesions formed in the rusted tissues. With the tobacco mosaic and ring spot viruses on sunflower leaves inoculated with *Puccinia helianthi* no local lesions appeared anywhere, but an assay showed the virus to be present, more being in the rusted than in the non-rusted areas.

If the virus concentration in non-rusted tissue about 15 days after inoculation is taken as 1, the concentration in rusted tissues was as follows: for *P. helianthi* and tobacco mosaic, 7, *U. appendiculatus* and lucerne mosaic 59, the same and tobacco necrosis 440, and tobacco ring spot 500. The bean variety Bountiful was infected with tobacco mosaic only when already infected with rust. Although normal bean tissues become more resistant with age to tobacco mosaic, tobacco necrosis, ring spot, and lucerne mosaic viruses, rusted tissues of similar age usually remain susceptible.

When a 0·003 per cent. concentration of rusted bean tissue was mixed with tobacco mosaic virus the number of local lesions on half leaves of tobacco was 177 per cent. greater than for the virus without rust extract, corresponding to about an elevenfold increase in infective virus concentration. Similarly, a 0·01 per cent. concentration of bean rust tissue caused a fivefold infective increase for tobacco necrosis virus. At a 1 per cent. concentration, however, tissues from non-rusted and rusted leaves, especially the latter, caused great reduction in virus infectivity.

The fact that infection of bean with *Erysiphe polygoni* or *Colletotrichum lindemuthianum* did not favour virus infection indicates that the greater susceptibility of rusted than non-rusted tissues to virus infection is not due to the mechanical punctures made in the cell walls by the rust haustoria.

BLAIR (I. D.). **Micro-organisms and plant growth.**—*Tech. Publ. Canterbury agric. Coll.* 5, 42 pp., 1951.

This publication is intended to demonstrate, in the light of recent microbiological investigations, that the ecology of the soil organism-plant community has now become a productive channel of fundamental research, and the direction in which further study is required. Pages 7–12 are concerned with the rhizosphere concept, methods of study, and an explanation of its effect. A section on micro-organisms and plant nutrition (pp. 18–20) deals with the part played by fungi in minor element deficiency. On pp. 21–25 the author discusses, with the aid of the literature (which covers 8 pages), fungi and the rhizosphere [*R.A.M.*, 30, p. 121], with

particular reference to parasitism within the rhizosphere population. Soil microbiological equilibrium and antibiotics in soil are treated on pp. 26–30.

Vavilov (N. I.). **The origin, variation, immunity and breeding of cultivated plants.** —xviii+364 pp., 7 pl., 25 figs., 4 maps, The Chronica Botanica Co., Waltham, Mass., U.S.A., 1951.

This complete translation, chiefly by K. S. Chester, of Vavilov's symposium entitled 'The Scientific Bases of Plant Breeding', published in 1935, includes a section on the immunity of plants from infectious diseases (pp. 96–168) [*R.A.M.*, 15, p. 39; 16, p. 662]. A selection of the basic world literature on breeding and genetics of wheat, classified under various headings, occupies 20 pages. Indexes to authors and plant names are provided.

Rose (C. D.) & Turner (J. N.). **Mould growth on leather as affected by humidity changes.**—*J. Soc. Leath. Tr. Chem.*, 35, pp. 37–42, 1 graph, 1951.

Studies at the British Leather Manufacturers' Research Association, Milton Park, Egham, Surrey, showed that, irrespective of the relative humidity of the atmosphere, [unspecified] mould growth can proceed on leather [*R.A.M.*, 30, p. 238] only when its moisture content exceeds a critical level varying within narrow limits according to the nature and content of water-solubles. The capacity for supporting growth may be associated with the way in which the moisture is held in the leather.

Hyde (G. R.), Mitton (R. G.), & Musgrave (A. J.). **A study of mould growth on pyrogallol-tanned leather and the associated changes of chemical composition and physical properties.**—*J. Soc. Leath. Tr. Chem.*, 35, pp. 82–103, 1 fig., 1951.

In studies at the British Leather Manufacturers' Research Association, Milton Park, Egham, Surrey, 96 samples of pyrogallol-tanned leather were treated with 0·25 per cent. w/w *p*-nitrophenol [*R.A.M.*, 29, p. 525] or oil or were washed to remove water-solubles; all were then stored for periods up to six months at 24° or 30° C. and approximately 100 per cent. relative humidity. The extent and types of mould growth were noted and the samples analysed and subjected to physical tests. The principal moulds detected were *Paecilomyces* (41 samples), *Aspergillus niger* (73), [ibid., 30, p. 238], and *Penicillium* spp. (76). The first was strongly repressed by the fungicide, favoured by the presence of oil, and grew much more vigorously in the second three-month period than in the first. *A. niger* was practically unaffected by the fungicide at the concentration used and was favoured by water-solubles. Both the higher storage temperature and the addition of oil appeared to encourage it. *Penicillium* spp. tended to attack samples treated with *p*-nitrophenol rather than others, possibly because the fungicide frees them from competition with moulds more susceptible to it. The growth of the *P.* spp. colonizing the leather was favoured by the absence of oil and the lower storage temperature; it was hardly affected by water-solubles.

Even prolonged and prolific mould growth caused relatively little change in the properties of vegetable-tanned leather [loc. cit.], since the moulds derive their nutriment chiefly from water-solubles and other constituents, rather than from the tanned collagen fibres. The low fungicide concentration repressed mould growth but did not prevent it. The experiments confirmed that moulds cause extensive hydrolysis of oils and greases in leather.

Burzlaff (D. F.). **The effect of extracts from the lichen, Parmelia molliuscula, upon seed germination and upon growth rate of fungi.**—Abs. in *J. Colo.-Wyo. Acad. Sci.*, 4, 2, p. 56, 1950.

Alcohol and water extracts of *Parmelia molliuscula*, a common foliose lichen of

North America, reduced fungal contamination of [unspecified] germinating seeds, but delayed their germination by four to seven days and retarded seedling growth after germination, though there was no effect on the percentage of germination. The extracts markedly retarded the growth and spore formation of *Penicillium* and *Rhizopus* in culture.

Leben (C.), Stessel (G. J.), & Keitt (G. W.). **An antibiotic that inhibits certain phytopathogens.**—Abs. in *Phytopathology*, 41, 1, pp. 23–24, 1951.

The activity of an antibiotic substance produced on a medium consisting of 40 gm. soy-bean meal, 20 gm. glucose, and 1·5 gm. calcium carbonate in shaken flasks and small tank fermentors by an unidentified species of *Streptomyces* bearing tight spore spirals was assayed by a plate test, using blotting paper disks and the fungus *Glomerella cingulata* [*R.A.M.*, 30, p. 279]. A partially purified extract of the active principle was used in agar streak tests. All the 16 fungi tested, including phytopathogenic species and *Trichophyton mentagrophytes*, were completely inhibited by 0·47 to 15 μgm. per ml. The antibiotic appears to be soluble in methanol, ethanol, and water more alkaline than pH 4 to 5, slightly soluble in acetone, *n*-butanol, and chloroform, and insoluble in ethyl ether and ethyl acetate.

Wolf (F. T.) & Wolf (F. A.). **Morphological effects of thymol and related compounds upon the germination of fungus spores.**—*Bull. Torrey bot. Cl.*, 77, 2, pp. 77–82, 5 figs., 1950.

In experiments at Vanderbilt University, Nashville, Tennessee, and Duke University, North Carolina, thymol [*R.A.M.*, 30, p. 59], carvacrol (an isomer of thymol), and 'stabilizer No. 1' (a mixture of isopropyl meta and para cresols) were fungistatic to *Aspergillus niger*, *A. sydowi*, *Penicillium crustosum*, *P. cyaneum*, *P. cyclopium*, *P. olivino-viride*, and *P. waksmani* at concentrations of about 0·025 per cent. in a modified Czapek solution. They produced visible changes in the germinating spores, involving alteration in the osmotic and permeability characteristics.

Fassi (B.). **Prove preliminari sull' azione antibiotica di 'Oospora virescens' (Link) Wallr. e sulle sue possibili applicazioni pratiche.** [Preliminary experiments on the antibiotic action of *Oospora virescens* (Link) Wallr. and its possible practical applications.—Reprinted from *Ann. Accad. Agric. Torino*, 90, 20 pp., 7 figs., 1950–51. [English summary.]

A strain of *Oospora virescens* isolated from poplar in Italy displayed a marked fungistatic effect. On malt agar the growth of the hyphae of various fungi parasitic and saprophytic on poplar became arrested. The inhibition zone in the case of *Botrytis cinerea* was over 1 cm. after a few days. Other inhibition zone measurements were *Fusarium* sp. 8 mm., *Fusicoccum populinum* 6 mm., and *Rhizoctonia* [*Corticium*] *solani* 5 mm.

Filtrates of 20-day-old cultures of the fungus reduced germination of other fungi by 90 to 95 per cent. and caused stunting of the germ-tubes. When the filtrate was sprayed on to the soil for the control of damping-off of young poplar seedlings infected by *C. solani*, its fungistatic effect was confirmed. Further work is in progress.

Bonde (R.) & Merriam (D.). **Studies on the dissemination of the Potato spindle tuber virus by mechanical inoculation.**—*Amer. Potato J.*, 28, 3, pp. 558–560, 1951.

Spindle tuber virus [*R.A.M.*, 30, p. 532] has been found in several potato seed stocks in Aroostook County, Maine, and in some of the newly released Kennebec

variety. The results of transmission experiments have already been noted [loc. cit.]. The necessity of eliminating spindle tuber from seed stocks is stressed.

Darby (J. F.) & Larson (R. H.). **Variation in virulence of naturally occurring strains of Potato virus Y.**—*Amer. Potato J.*, 28, 3, pp. 561–562, 1951.

Because potato rugose mosaic symptoms [*R.A.M.*, 29, p. 48] are varied and difficult to recognize in the field, a selection from 25 isolates of potato virus Y, originating from various countries, 16 from potato and two from tobacco, were studied at the University of Wisconsin. Several isolates were very virulent, killing certain potato varieties while affecting others only slightly. Local necrotic lesions were produced by some isolates, others caused green local lesions on a chlorotic leaf. The disease indexes of the isolates (compared on 22 potato varieties) ranged from 25 to 78. Arran Banner and Snow Drift were the most tolerant, Placid, Cobbler, Majestic, La Salle, La Soda, Kennebec, Russet Burbank, Pontiac, Sebago, Green Mountain, Russet Rural, White Rose, Essex, and Katahdin were intermediate in their reaction, and Triumph, Chippewa, Red Warba, White Cloud, USDA seedling 41956, and Ontario the most susceptible.

All isolates were inactivated by heating for 10 minutes at 62° C., whereas all survived 10 minutes at 54°. All remained infectious after 6 days storage *in vitro* at 20° to 22°, but were inactive after 18 days. Dilution end points ranged from 1:10,000 to 1:750,000, most of the isolates being inactivated between 1:50,000 and 1:100,000. All isolates remained virulent for up to 11 months when desiccated in tobacco leaf tissue and stored over calcium chloride at 4°. On tobacco marked vein-clearing followed by spot necrosis was produced at 24° by all isolates in combination with the ring spot strain of potato virus X. This was used as a diagnostic test for the presence of virus Y. None of 30 wild and cultivated *Solanum* species was immune from all virus Y isolates.

Evidence indicates that the components of the virus complex causing rugose mosaic, namely potato viruses X and Y, exist as strains which vary in virulence. Rugose type symptoms may be produced by virus Y alone.

Starr (G. H.). **Some factors influencing infection by Corynebacterium sepedonicum in Potato plants.**—*Amer. Potato J.*, 28, 3, pp. 551–558, 1951.

Plants from potato tubers of a single variety inoculated in a presumably uniform manner with the ring rot bacterium (*Corynebacterium sepedonicum*) [*R.A.M.*, 29, p. 530; 30, p. 533] often show great variation in the severity of symptoms. In experiments conducted over a period of years at Wyoming Agricultural Experiment Station, Laramie, when potato seed pieces were cut directly through one or more eyes and subsequently inoculated by steeping in a bacterial suspension for one hour plant symptoms were more prevalent and more severe than from tubers receiving the same treatment but cut between the eyes.

The repeated use of bacterial suspension (7·5 gm. bacterial ooze to 250 ml. water) for inoculation (20 half tubers for one hour) drastically reduced the severity and prevalence of ring rot in the third treated lot. No symptoms developed on the fourth and subsequent lots. Further experiments using inocula from resistant and susceptible varieties [ibid., 28, p. 416] showed that they differed somewhat in virulence from year to year, but on the average of five years' tests there was little difference between them.

From 1946 to 1949 no ring rot symptoms developed in potato plants when the inoculum was diluted more than 1 in 1,000. However, in 1950 symptoms were observed in all dilution series, even in the 1:1,000,000, and several potato lots inoculated with trace amounts of bacteria in the previous season or earlier showed their first symptoms.

Lane (G. H.). **Studies of Potato seed-piece rot.**—Abs. in *J. Colo.-Wyo. Acad. Sci.*, 4, 2, p. 57, 1950.

Chemical fungicides applied to potato seed pieces to prevent decay by [unspecified] soil-borne fungi [*R.A.M.*, 28, p. 471] did not improve stands during several years' tests in Colorado, mainly because favourable growing conditions permitted untreated seed, though attacked, to produce relatively vigorous plants. Untreated seed developed visible loci of attack about ten days to two weeks after planting. In a field test cut seed pieces treated with arasan had significantly fewer spots of rot 20 days after planting than the untreated, but yields were much the same. It is suggested that a comparison of the numbers of fungal invasion loci on the cut surface of the seed pieces provides a method of comparing fungicidal effectiveness in seasons when stand and yield do not appear to be affected by seed piece rot.

Garber (R. H.), Schaal (L. A.), & Fults (J. L.). **Selectivity of pentachlorophenoxy acetic acid against Streptomyces scabies (Thaxt.) Waksman and Henrici.**—Abs. in *J. Colo.-Wyo. Acad. Sci.*, 4, 2, p. 61, 1950.

The results are given of tests on the selective action of pentachlorophenoxyacetic acid [*R.A.M.*, 29, p. 583] in modified potato dextrose agar against race 128 of *Streptomyces* [*Actinomyces*] *scabies*, made with mixed cultures of *A. scabies*, *Escherichia* [*Bacterium*] *coli*, *Micrococcus pyogenes* var. *aureus*, and two forms of *Penicillium notatum*, designated as Nos. 54 and 90. *A. scabies* was eliminated at a concentration of 32 p.p.m., while the remaining organisms were partly inhibited but not eliminated at 1,000 p.p.m.

Sívori (E. M.). **La degeneración de la Papa.** [Potato degeneration.]—*Cienc. e Invest.*, 7, 7, pp. 291–302, 1 diag., 1951.

This is a review, based on the literature, of the problem of potato degeneration in Argentina [cf. *R.A.M.*, 29, p. 580], with particular reference to the part played by [unspecified] virus diseases [ibid., 30, p. 427] and environmental conditions such as high temperatures on various parts of the plant.

Klinkowski (M.). **Ein Beitrag zur Frage der Infektionsmöglichkeit des X-virus der Kartoffel bei Wurzelkontakt.** [A contribution to the question of the possibility of infection by Potato virus X through root contact.]—*Z. PflKrankh.*, 58, 1–2, pp. 3–6, 1951.

In an experiment at the Aschersleben branch of the Central Biological Institute, Germany, one row of healthy and one of virus X-infected Ackersegen potato tubers [*R.A.M.*, 30, p. 428] were planted in a hot-bed in which potatoes had not been grown previously. Glass panes were set vertically between the rows to prevent contact between the aerial parts. Of the plants from the healthy tubers 79·2 per cent. were infected with virus X when tested on tobacco, and 36 per cent. of the tubers. The evidence demonstrates that infection took place through the roots [ibid., 30, p. 359]. In the field, where root contacts are more abundant, the infection rate is probably much higher.

Struble (F. B.), Cordner (H. B.), & Morrison (L. S.). **Relative incidence of internal cork of Sweet Potatoes in Oklahoma in 1950 and 1951.**—*Plant Dis. Reptr*, 35, 5, pp. 227–229, 1 map, 1951. [Multilithed.]

Surveys of the prevalence of internal cork virus of sweet potatoes [*R.A.M.*, 30, p. 487] made in Oklahoma in 1950 and 1951 showed that the disease is widespread, but apparently of minor importance.

Grogan (R. G.) & Hanna (G. C.). **Sweet Potato internal cork in California.**—*Plant Dis. Reptr*, 35, 5, pp. 230–231, 1951. [Multilithed.]

Internal cork [virus] of sweet potato [see preceding abstract] was found in 1950 in varietal trial plots at Davis and Shafter and in an experimental planting of Bunch Porto Rico at Manteca, California. A survey is being conducted to determine whether commercial seed stocks of varieties widely grown in California are affected.

Chowdhury (S.). **Preliminary experiment on seed treatments with yellow cuprocide.**—*Sci. & Cult.*, 16, 2, pp. 78–79, 1 graph, 1950.

A preliminary report of this work on the control of seedling blight and leaf spot of rice caused by *Helminthosporium oryzae* [*Ophiobolus miyabeanus*] by means of yellow cuprocide at the Plant Pathological Laboratory, Jorhat, Assam, has already been noticed from another source [*R.A.M.*, 30, p. 262]. Naturally infected seed of the variety Nagrasail was used.

Warcup (J. H.). **Studies on the growth of Basidiomycetes in soil.**—*Ann. Bot., Lond.*, N.S. 15, 59, pp. 305–317, 1 pl., 1 diag., 1 graph, 1951.

An account is given of studies at the Botany School, Cambridge, on the incidence of fructifications of basidiomycetes [*R.A.M.*, 25, p. 512] collected at Lakenheath Warren, Suffolk, from 1947 to 1949. From five grasslands, namely, alkaline A and B (pH 8 and 7, respectively), C varying about neutrality (pH 6·4), and highly acid D and E (pH 4·4 and 3·8, respectively), thirty-nine species were obtained. Most occur on the alkaline to slightly acid soils, 24 being obtained from B and 19 from C, while on A, D, and E the fungus flora was very poor (six, eight, and four species, respectively). Attempts have been made to isolate the fungi from the mycelium in the soil. It was found that some species inhabit the litter layer rather than the mineral part of the soil; a few form extensive rhizomorph systems which may penetrate to a depth of 12 to 14 in.; while fairy ring fungi such as *Marasmius oreades* [ibid., 30, p. 323], *Psalliota arvensis*, and *Tricholoma nudum* have a well-defined mycelial zone in the soil, from which the fungus could be isolated. Profile studies have shown that these zones contain both fewer species and smaller numbers of microfungi than the normal soil around, although *Arachniotus*, *Chaetomium*, *Gymnoascus*, and *Penicillium* were isolated more frequently from mycelial zones than from normal soil.

Nutman (F. J.), Sheffield (F[rances] M. L.), Swainson (O. S.), & Winter (D. W.). **The sudden-death disease of Cloves and its economic and agricultural significance.**—*Emp. J. exp. Agric.*, 19, 75, pp. 145–159, 4 graphs, 1 map, 1951.

As the result of epidemiological evidence on the rate of spread of sudden death of cloves [*R.A.M.*, 30, p. 343] in Pemba [ibid., 29, pp. 277, 382], the situation was considered sufficiently serious in 1948 to justify an attempt to control the disease before scientific proof of its etiology had been obtained. Although the attempt was eventually abandoned the data collected in preparation for it are given and discussed. From the results of a partial survey made in 1948 [loc. cit.] and another in 1949–1950, there is an estimated total of over 2,000 separate outbreaks in Pemba which vary in size but average 25 dead trees in each. New outbreaks are constantly arising, the present annual rate of increase amounting to about 14 per cent. They increase in size at a highly variable rate but, on the average, the radial rate of spread is approximately constant. The probable future development of the disease and its effects on the economy of the Zanzibar Protectorate are discussed. Assuming that direct control is a practical impossibility suggestions are made for rehabilitation in Zanzibar Island, where up to the present the disease has been far more destructive

than in Pemba, where the problem may not become acute for some years. They are based on the elimination of residual sources of disease in areas already devastated, followed by planned replanting with cloves and other crops.

HUGHES (C. G.). **Testing Sugar-Cane varieties for resistance to downy mildew disease.**—*Cane Grs' quart. Bull.*, 14, 4, 2 figs., pp. 163–166, 1951.

In trial tests of sugar-cane varieties for resistance to downy mildew [*Sclerospora sacchari*: see next abstract] at Elliot River, Queensland, in 1949, diseased stools and maize were planted alternately among the healthy plants. Spread of the disease is fairly rapid among cane plants and extremely so among maize. The approved varieties Atlas, C.P. 29/116, Clark's Seedling, Co. 301, Comus, M. 1900 S., Orion, Q. 42, and S.J. 2 were classed as highly resistant; Badila, Cato, Kopri, Oramboo, Pindar, P.O.J. 2725, Q. 25, Q. 28, Q. 47, Q. 813, and S.J. 4, as resistant; Co. 290, D. 1135, E.K. 28, H.Q. 409, Mahona, Pompey, Q. 10, Q. 44, Q. 45, Q. 48, Q. 49, Q. 50, Q. 51 as intermediate; P.O.J. 213, P.O.J. 2714, P.O.J. 2878, S.J. 16, Trojan, and Vesta as susceptible; and B. 208 and Eros as extremely susceptible.

Fiftieth Annual Report of the Bureau of Sugar Experiment Stations, Queensland.—54 pp., 3 pl., 1 graph, 1950.

In the report of the Division of Entomology and Pathology by R. W. MUNGOMERY (pp. 38–46) [cf. *R.A.M.*, 29, p. 331] it is stated that with rigid control of planting material there is every prospect of controlling ratoon stunting disease [ibid., 30, p. 246 and next abstract] in the Mackay district without the loss of the variety Q. 28.

The general decrease in Fiji [virus] disease [see above, p. 558] continued in Bundaberg and Moreton. There was a fresh outbreak in a field of P.O.J. 2878 in the Isis area after a lapse of nearly four years. Elsewhere the Bundaberg Cane Pest and Disease Control Board rogued 394 affected stools. In the Moreton Mill area 1,186 stools were rogued from 3,932 acres inspected. The replacement of P.O.J. 2878 by C.P. 29/116 and other comparatively resistant varieties has helped considerably in controlling the disease. Not one infected stool was found at Maryborough.

An extensive outbreak of yellow spot (*Cercospora kopkei*) [ibid., 28, p. 142] occurred in North Queensland during late summer. Although this is the first positive record of this fungus in Queensland there is no doubt that it was present already in a mild form. The first reports came in March from Mossman where numerous fields of Trojan in sheltered positions were found to be affected. Within the next few weeks it was found in the Hambledon, Mulgrave, Babinda, Innisfail, and Tully areas. In the worst affected fields 80 per cent. or more of the leaf area was killed and growth ceased entirely in April. Eros and P.O.J. 2878 were also affected, Comus was somewhat susceptible, and Badila, Pindar, Q. 44, and Q. 50 were barely attacked.

The succession of damp days during the cooler months of the winter resulted in appreciable losses in some areas from eye spot disease (*Helminthosporium sacchari*) [ibid., 29, p. 478]. At Bingera in the Bundaberg area the susceptible variety Atlas was so badly affected that most of the leaf area of the crop was destroyed and growth ceased several months earlier than usual. P.O.J. 2878 and Vesta were affected to a lesser extent. Very severe eye spot occurred on a block of Trojan in the Mackay district. This is the first record of the disease affecting this variety in Queensland. There were losses due to the top rot stage of the disease as well as to the spots and runners.

Inspections made during 1949 indicated that the outbreak of downy mildew (*Sclerospora sacchari*) [ibid., 29, p. 478; 30, p. 1 and preceding abstract] at Hambledon, North Queensland, has been brought under control. Only seven diseased stools were found in the Bundaberg district, and these were confined to a single

block of third ratoon P.O.J. 2878 which will be ploughed out after the present harvest.

The results from experimental plots in the 1949 planting season again demonstrated the undoubted value of dipping the setts in a mercurial solution as a means of controlling pineapple disease (*Ceratostomella paradoxa*) [ibid., 30, p. 543 and next abstracts] in the Lower Burdekin district. On the Fairymead Plantation in South Queensland 550 bags of plants per day were dipped in a 6,000 gal. tank by means of a mobile crane.

Red rot (*Physalospora tucumanensis*) [loc. cit.] occurred sufficiently widely in the Mackay district and at Bundaberg to emphasize the susceptibility of the variety Q. 50. In some cases losses were quite heavy; fields of this cane should be harvested by the middle of the crushing season at the latest. Laboratory studies indicate that there are several strains of the fungus present in Queensland. The perfect state has been obtained in cultures of nine strains, but so far no perithecia have been found in the field.

Gumming disease (*Xanthomonas vasculorum*) was found during harvest in three blocks of S.J. 4 in the quarantined part of the Mossman area. The blocks in question have been destroyed. The susceptible varieties H.Q. 426 and S.J. 4 have been re-introduced in the Mulgrave mill area.

In resistance trials at Pine Creek, North Queensland, 41 M.Q. 105, a promising new seedling from Macknade, was quite susceptible to leaf scald (*X. albilineans*).

Although the cause of 'droopy top' disease [ibid., 28, p. 244] is still unknown there are indications that a somewhat similar condition in Q. 50 at Mt. Pelion in the Mackay district may be prevented by the addition of copper to the soil. In a preliminary trial the ratoons which had shown the disease responded markedly to 55 lb. copper sulphate per acre, there being an estimated yield difference of 20 tons per acre between a treated plot and a neighbouring check plot.

Annual Report of the Department of Agriculture and Stock for the year 1949–50, Queensland.—99 pp., 6 pl., 1 fig., 1 diag., 5 graphs, 1950.

In the Pathology section (pp. 33–35) of this report [cf. *R.A.M.*, 29, p. 202] N. J. King states that ratoon stunting [see preceding abstract] is still prevalent in Q. 28 sugar-cane in the Mackay district of Queensland, 10 per cent. of the farms being affected. There is little doubt that P.O.J. 2878 and M. 1900 Seedling, and possibly some of the older varieties of the district are also affected. The disease was transmitted by sett inoculation with juice from diseased cane. Red rot (*Physalospora tucumanensis*) [loc. cit.] decreased in severity in south Queensland with the reduced planting of the very susceptible variety Co. 290, and the losses in this area were not important. In 1949 Trojan and Q. 50 were much more susceptible to *Ceratostomella paradoxa* than Badila [loc. cit. and next abstract].

Wismer (C. A.). **Controlling pineapple disease of Sugar Cane.**—*Hawaii. Plant. Rec.*, 54, 1, p. 23–53, 11 figs., 1951.

This Ph.D. thesis reports extensive tests carried out at the Hawaiian Sugar Experiment Station with more than 60 fungicides for the control of pineapple disease of sugar-cane (*Ceratostomella paradoxa*) [*R.A.M.*, 30, p. 78 and preceding abstracts], using the laboratory thread technique of Forsberg [ibid., 28, p. 399] for the preliminary screening of fungicides, a sand-soil-cornmeal inoculum laboratory method, and replicated field tests in which sugar-cane cuttings were artificially inoculated. The results showed that the best control of the inoculated seed pieces is by pyridylmercuric acetate, pyridylmercuric chloride, and phenyl mercuric acetate (PMA). The last-named proved less expensive on a field scale. Field tests to evaluate the different fungicides are of no value unless the disease organism is present, but they may help to determine if it is and, therefore, if

treatment is needed. Varieties respond differently to a hot water treatment of 50° C. for 30 minutes or 52° for 20 minutes. Germination of 37–1933 was improved thereby, but there was no response by 38–2915. Excellent protection of cuttings from rotting was obtained in the laboratory when PMA (10 per cent. aqueous solution) was added to the hot water at the rate of ½ pint per 100 gals. Hot water alone or followed by fungicide treatment gave less protection than did fungicide alone. The recommended strength for dipping or spraying cuttings is one quart PMA per 100 gals. water. Cuttings should be treated when planted under unfavourable germination conditions.

Canter Lund (Hilda M.) & Lund (J. W. G.). **Studies on plankton parasites. III. Examples of the interaction between parasitism and other factors determining the growth of Diatoms.**—*Ann. Bot., Lond.*, N.S. 15, 59, pp. 359–372, 2 pl., 1 fig., 3 graphs, 1951.

Statistical studies were carried out at the Freshwater Biological Association Laboratory, Ambleside, on the interrelations of plankton diatoms and *Oscillatoria* with their parasitic chytrids [*R.A.M.*, 30, p. 434], *Rhizophidium planktonicum* [ibid., 28, p. 73] and *R. megarrhizum*, respectively, in the English Lake District. It was found that the parasites may either delay the time of maximum algal number or decrease the size of the maximum. Parasitism of one alga usually favours the development of others and various other complexities result from the interaction of these factors with nutritional conditions.

Drechsler (C.). **A Pythium with stout oogonial spines and coiled antheridial branches.**—*Bull. Torrey bot. Cl.*, 77, 6, pp. 442–461, 9 figs., 1950.

A description is given of *Pythium helicandrum* n.sp., isolated from rotting roots of *Rumex acetosella* near Beltsville, Maryland. The ellipsoid sporangia measure 25 to 80 by 25 to 55 μ. The spiny oogonia, 17 to 32 (average 26) μ in diameter, have a single antheridium coiled round the oogonial stalk. The oospores are 15 to 27 (22·3) μ in diameter. Pathogenicity was established by transferring portions of young mycelium from pure culture to shallow incisions in cucumbers. After two or three days at 28° C. a progressive softening of the tissues occurred. The progress of the fungus was marked by a watersoaked zone about 20 mm. wide behind which aerial mycelium grew out, appearing at first as a light, fleecy layer and later as a cottony weft covering the cucumber from end to end.

Gopalkrishnan (K. S.). **Notes on the morphology of the genus Hemileia.**—*Mycologia*, 43, 3, pp. 271–283, 7 figs., 1951.

This is a full account of studies already noticed from another source [*R.A.M.*, 30, p. 345].

Luttrell (E. S.). **The morphology of Dothidea collecta.**—*Amer. J. Bot.*, 38, 6, pp. 460–471, 33 figs., 1951.

The developmental morphology of *Dothidea collecta* was studied at the Georgia Experiment Station as a basis for the solution of taxonomic problems in the Dothideales [*R.A.M.*, 28, p. 547]. The order is re-defined as follows: asci thick-walled, bitunicate, clavate to cylindrical, borne in polyascous, perithecium-like locules in an ascostroma; centrum composed of a pseudoparenchymatous tissue, asci arising in a fascicle from short ascogenous hyphae and growing upwards as a group into the sterile tissue which disintegrates as the asci develop; opening typically by a lysigenous pore in the stromal tissue at the apex of the locule; ascostroma innate, erumpent, or superficial, pulvinate, lobed or perithecium-like, uni- or plurilocculate. A compact, homogeneous order is thus obtained, including

the majority of the aparaphysate fungi commonly placed in it, besides many of the Pseudosphaeriales and Sphaeriales which are similar to *Mycosphaerella*. At present it appears that only the Dothideaceae should be in the order, although Martin's inclusion of the Capnodiaceae may prove valid [*in* Dictionary of the Fungi, 3rd Ed., 1950]. It is supported by Fraser's developmental study of *Capnodium salicinum* [*R.A.M.*, 15, p. 530]. This definition would exclude all paraphysate perithecial forms with unitunicate asci, such as *Phyllachora*.

Ling (L.). **Studies in the genus Cintractia. III. C. leucoderma and related species.**—*Mycologia*, 43, 3, pp. 310–318, 2 figs., 1951.

In further studies on the genus *Cintractia* [cf. *R.A.M.*, 30, p. 247], descriptions and synonymy of *C. leucoderma*, *C. l.* var. *striata* n.comb. (*C. striata*), *C. pachyderma*, and *C. scleriae* n.comb. (formerly included in *C. leucoderma*) all on *Rhynchospora* spp., are presented. The spores of *C. leucoderma* are verrucose with the verrucae frequently obscure and sometimes confluent into short, irregular striae, or cerebriform. In *C. pachyderma* they are ornamented with fine verrucae densely arranged into regular, parallel striae, while in *C. scleriae* the verrucae are prominent but rarely confluent.

Hughes (S. J.). **Studies on micro-fungi. III. Mastigosporium, Camposporium, and Ceratophorum.**—*Mycol. Pap., Commonw. mycol. Inst.*, 36, 43 pp., 1 pl., 22 figs., 1951. 9*s*.

Continuing his studies of Hyphomycetes [cf. *R.A.M.*, 29, p. 279], the author deals with several species having phragmospores with appendages. *Mastigosporium album* from *Alopecurus pratensis* [ibid., 30, p. 473] is described and illustrated. *Camposporium* is considered to include three species of saprophytes, one of them new. The type species of *Ceratophorum*, *C. helicosporum*, is reviewed, together with eight other *C.* spp. *C. setosum* parasitic on *Lupinus* spp. and *Crotalaria* spp. [ibid., 30, pp. 470, 507], and *C. albizziae* on *Albizzia* spp. [ibid., 29, p. 251] are placed in Saccardo's subgenus *Pleiochaeta* [ibid., 7, p. 583], which is raised to generic rank with the new combinations *P. setosa* (type) and *P. albizziae*. Since *C. ulmicola*, originally described on living leaves of *Ulmus fulva* and *U. americana*, has dictyospores it becomes the type of the new genus *Dictyodesmium* Hughes. The author follows Sprague in considering the genus *Amastigosporium* [ibid., 18, p. 34] as unnecessary. *Megacladosporium* Viennot-Bourgin [ibid., 28, p. 472] is discussed.

Hughes (S. J.). **Studies on micro-fungi. IX. Calcarisporium, Verticicladium, and Hansfordia (gen. nov.).**—*Mycol. Pap., Commonw. mycol. Inst.*, 43, 25 pp., 1 pl., 6 figs., 1951. 5*s*. 6*d*.

The author redescribes from pure cultures and herbarium material the type species of *Calcarisporium* and *Verticicladium*, *C. arbuscula* and *V. trifidum*, respectively; the former grows on *Dasyscypha* and other fungi and the latter on dead *Pinus sylvestris* needles. *Hansfordia* n.gen. is described with seven species, two transferred from *Verticicladium*, three from other genera, and two new ones.

Jehle (R. A.), Jenkins (Anna E.), Jeffers (W. F.). **Spot anthracnoses known in Maryland and their distribution by counties.**—*Plant Dis. Reptr*, 35, 4, pp. 194–199, 1 fig., 1 map, 1951. [Multilithed.]

This list of the spot anthracnoses occurring in Maryland [*R.A.M.*, 26, p. 408; 28, p. 143; 30, pp. 110, 323], together with a map showing their distribution by counties, includes new records for the State on *Rosa multiflora* [*Sphaceloma rosarum*: ibid., 12, p. 96, 30, p. 434], a shrub widely advocated for hedges, and ivy [*S. hederae*: ibid., 26, p. 546].

Dennis (R. W. G.). **Notes on Scottish fungi.**—*Trans. bot. Soc. Edinb.*, 35, 4, pp. 427–430, 1 fig., 1951.

This list of fungi collected in the Western Highlands of Scotland [*R.A.M.*, 28, p. 595] during October, 1950, includes descriptions of *Pseudopeziza svalbardensis*, causing dark brown spots on leaves of *Saxifraga aizoides*, and *Stictis arctostaphyli* on *Arctostaphylos uva-ursi*, both apparently new records for Britain.

Nicolas (G.). **Contribution à l'étude de la flore mycologique des Pyrénées-Orientales d'après les récoltes de Conill de 1835 [1935] à 1939.** [A contribution to the study of the mycological flora of the eastern Pyrenees from the collections of Conill from 1935 to 1939.]—*Bull. Soc. mycol. Fr.*, 66, 1, pp. 43–57, 1950.

This annotated list (arranged under the Latin names of the hosts) of fungi collected in the eastern Pyrenees between 1935 and 1939 includes *Uromyces limonii* [cf. *R.A.M.*, 30, pp. 195, 490] and *Phleospora jaapiana* on *Statice limonium*, *Chrysomyxa rhododendri* on *Rhododendron ferrugineum* [cf. ibid., 22, p. 231; 30, pp. 124, 202], *Septoria lavandulae* on lavender (*Lavandula pyrenaica*) [ibid., 17, p. 71], and *Cycloconium oleaginum* on olive [ibid., 4, p. 358; 25, p. 508; 30, p. 235].

Trotter (A.). **La mico-lichenologia e la fitopatologia nel quadro del popolamento bio-geografico della Libia.** [Mycolichenology and phytopathology within the framework of the biogeographical population of Libya.]—*Delpinoa* (*Boll. Orto bot. Napoli*), 3 (Tomo 20), pp. 155–174, 1950.

About 300 species of fungi have been recorded for Libya [*R.A.M.*, 11, p. 458; 25, p. 306]. Parasites listed here include *Uromyces fabae* [C.M.I. map No. 200], *Puccinia allii*, *P. pruni-spinosae*, *Urocystis anemones*, *Oidium tuckeri* [*Uncinula necator*], *Plasmopara viticola*, *Polythrincium* [*Cymadothea*] *trifolii*, *Peronospora schleideni* [*P. destructor*], *Erysiphe graminis*, *Puccinia glumarum* [ibid., No. 97], *P. graminis*, *P. triticina*, *U. hordei*, *U. nuda*, *Cystopus candidus*, and *Graphiola phoenicis* and *Mauginiella scaettae* on date palm.

Studies in blister blight control. I. The programme of research. II. Preliminary results of tests with fungicides. III. A warning regarding the possible dangers attendant on the continued adoption of pruning into the dry weather as an agricultural control measure. IV. Mechanical dusting against blister blight—Section 1. V. Mechanical dusting against blister blight—Section 2.—*Tea Quart.*, 21, 2–3, pp. 12–36, 1 pl., 1950. [Received April, 1951.]

In No. I of this series of papers on the control of blister blight of tea (*Exobasidium vexans*) [see next abstracts] J. Lamb enumerates the lines on which research is to be carried out in Ceylon. In No. II C. A. Loos describes the results of preliminary tests on the relative efficiency of perenox at 4 oz. in 10 gals. water, as against blitox at the same rate and yellow cuprocide at 2½ oz. in 10 gals. The first two appeared equally good and there was no significant difference between perenox and yellow cuprocide. Preliminary trials on the protection of tea in plucking and recovering from pruning were concluded. In No. III G. B. Portsmouth recommends that, on estates which have to be pruned into the dry weather because of serious and prolonged blister blight attacks during the rest of the year, bushes should be protected from the direct rays of the sun by piling up prunings, grass, or jungle loppings on top of them for at least a month after pruning. Pruned leaves should not be forked into the soil if there is imminent danger of drought. In Nos. IV and V H. Dike describes experiments on the Castlereagh Estate with the Whirlwind Duster [loc. cit.] which deposits a fine coverage of dust upon the surface of the tea leaves and stems both near to and distant from the machine. Cuprosana is a copper dust manufactured especially for use with this machine; 7 to 10 lb. per

acre are required for adequate protection. Rounds of five or six days may be required for effective control and ten days for a field three years from pruning. Areas pruned in June may require a four-day round up to tipping time.

Proceedings of the ninth biennial conference.—*Tea Quart.*, 21, 4, pp. 1–47, 1 pl., 2 graphs, 1951.

At this conference of the Tea Research Institute, Ceylon, held at Nuwara Eliya, 1st to 4th December, 1950, J. Lamb (pp. 4–7) outlined the past, present, and future plans for the blister blight [*Exobasidium vexans*] control campaign [*R.A.M.*, 30, p. 90 and preceding and next abstracts]. G. K. Newton gave a paper on proprietors' views (pp. 7–10).

G. B. Portsmouth dealt with crop protection during recovery from pruning. During the year, a 200-acre Kataboola group estate of tea bushes recovering from pruning during the south-west monsoon was sprayed (irrespective of weather) with 4 oz. perenox in 10 gals. water [ibid., 29, p. 57; 30, p. 390] at 4-day intervals from mid-July during the first three rounds and then at 7-day intervals. Pruning was completed by the middle of August. The July to October rainfall was heavy (72·64 in.). In the earlier pruned fields spraying did not commence until about one month after pruning, but for all later fields an interval of only two weeks was allowed in order to avoid blister blight infection of the earliest shoots. Although the area normally suffers very heavily from attacks the experiment was very successful on the whole and good protection was obtained except after excessive rain in September. In two fields where the bushes were badly debilitated recovery was very slow. A period of rest with spray protection before pruning is therefore recommended for areas where starch reserves are low. The average cost per round per acre up to 31st October amounted to Rs. 2·26, with a total inclusive cost of Rs. 36·16 per acre (except for the cost of staff grade supervision) for an average of 16 rounds. For steeper and more difficult fields the figure would be Rs. 2·66 per round per acre. Similar experiments were conducted on several other estates of about 50 acres in bad blister blight areas. Where the experiment was sufficiently advanced the results showed that good crop protection was obtained, the cost per acre per round varying from Rs. 1·6 to Rs. 4·57 according to the estate concerned, with a fair average of Rs. 2·5 to 3 per acre per round. It is concluded that spraying with a copper fungicide on 7-day rounds regardless of weather conditions can provide satisfactory protection for tea recovering from pruning during the south-west monsoon.

Concerning crop protection during plucking, C. A. Loos reports the results of trials on an area of pruned tea at St. Coombs started in December, 1948. Weekly and fortnightly sprayings with perenox (4 oz. in 10 gals. water) were applied to double rows of 50 bushes, on either side of which grew two guard rows. Four replications on a randomized basis covered $\frac{1}{8}$ acre. Blister blight was not very severe in 1949 and fortnightly applications gave almost as good results as weekly. Even so, weekly sprays proved profitable as the increase in yield over the unprotected was 85·2 lb. of made tea per acre following 29 sprayings at a cost of Rs. 65·25, as against 81·2 lb. from the fortnightly plots. In 1950 the disease was more severe. The plots sprayed weekly exceeded the untreated by 168·2 lb. of made tea per acre at a cost of Rs. 67·5, and the fortnightly 131·2 lb. at Rs. 36. It is suggested that spraying intervals should be between 7 and 14 days, preferably 9 to 10 days, based on the usual estate practice of plucking on 9-day rounds. During the 1950 season the above experiment was repeated on a much larger scale, commencing in May on an area pruned lightly in December, 1949, and brought into tipping without spray protection. Plots of about $2\frac{1}{2}$ acres were (A) unsprayed, (B) sprayed with perenox at 10 to 13 gals. per acre at 9- to 10-day intervals through both monsoon periods, but ceasing in January when the dry weather set in, and (C) sprayed as for

plot B until 9th September. Severe crop losses were evident from 14th July on the unprotected plot compared with the sprayed ones, which were markedly superior in appearance. On C blisters were very evident by 16th October and on 25th the crop started to decline. The crop returns for the three plots were 234·5, 407·8, and 383·7 lb. per acre, respectively, the total spraying cost for B and C being Rs.49·5 and 37·5, respectively.

In connexion with the application of crop protection methods C. L. Scoles discussed wet spraying (pp. 22–27), including the problems of equipment, field organization, labour, supervision, labour organization, technique, effects of weather, and rates of fungicide application and output in relation to bushes recovering from pruning, with brief notes on spraying tea in plucking.

F. Haworth (pp. 27–28) dealt with dusting, describing and commenting on a method by which a Kataboola tea estate was dusted during the north-east monsoon making use of convection currents.

Of two papers on crop protection by copper fungicides, the first by F. Haworth (pp. 28–32) was concerned with the effect of weather on copper residues. In experiments at the Tea Research Institute during 1950, pieces of cut flush were treated with 6 and 12 per cent. copper oxychloride dust and put out into moderately heavy rain with two sets sprayed with copper oxide, one being allowed to dry before being exposed. The copper content of the individual leaves of one piece from each set was determined daily. The results showed that the fungicides applied to dry leaves were retained against the washing action of moderately heavy rainfall. A comparatively small amount of rain appeared to suffice to remove the bulk of the fungicide, but the remainder was retained against much more prolonged washing. A further experiment showed retention to be reasonably good when sprays were applied to wetted leaves. No retention was detected, however, in four bushes of clone No. 21 sprayed at the beginning of a deluge of rain. From the results of large-scale spraying trials at Kataboola and dusting trials at Castlereagh it appears that the small amount of copper fungicide retained under bad weather conditions is sufficient to give a measure of protection against blister blight infection; it is emphasized that spraying and dusting are not necessarily equally efficient. Analyses following small-scale dusting trials on the Castlereagh estate during the south-west monsoon and following the St. Coombs experiment above indicate that if spraying at the prescribed rates is carried out immediately after plucking the copper content of the made tea should be less than 100 p.p.m. even under dry conditions [ibid., 30, p. 197]. Made teas from areas under typical south-west monsoon conditions can be expected to have copper contents below 80 p.p.m. provided that 7 to 8 days elapse between dusting and plucking.

In the second paper by J. Lamb (pp. 33–35), entitled 'Copper residues in relation to quality', it is stated that a temporary copper tolerance of 150 p.p.m. in made tea is being allowed for the United Kingdom tea market by the Metallic Contamination Sub-Committee of the Food and Labelling Division of the Ministry of Food to cover the residue accrued on tea leaves by the use of copper fungicides.

In connexion with crop protection by modified agricultural methods T. E. Walter dealt with (I) the control of shade (pp. 35–37), C. A. Loos described (II) the Kataboola loss of crop experiment (pp. 37–40), and G. B. Portsmouth (pp. 41–43) summarized (III) general considerations. The practice of cutting out shade trees [*R.A.M.*, 28, p. 34] as a means of controlling blister blight appears to have arisen from a misunderstanding of the recommendation that shade should be controlled, and from a belief that yields would be increased as a result. Some degree of shade control may certainly be desirable where the overhead canopy is exceptionally heavy and in areas where mist is prevalent for most of the day [ibid., 29, p. 337], but it is doubtful whether disease incidence would be reduced to any significant extent. Tea, moreover, is naturally a shade-loving crop. The only permissible

method of effecting shade control is by lopping just before the monsoon, so that the loppings can be forked in with manure at the most effective time and shade is at its minimum during the early part of the monsoon. *Grevillea* spp. should not be lopped at less than 15 to 20 ft. from the ground. Old *Albizzia moluccana* trees which have outgrown their usefulness should be removed gradually. Trees in tea plantations should be of moderate size, planting being based on a rotation according to the growth and size of each species and on an uneven-aged stand, so that a constant supply of timber and degree of shade is maintained.

In the Kataboola experiment five plots of tea were pruned in December, 1949, tipped at 7 in., brought into plucking on 5th June, 1950, and treated as follows: (1) unprotected; plucking was at ten-day intervals taking a bud and two fully-opened leaves and leaving one leaf above the fish leaf which is the normal estate practice; (2) protected at weekly intervals with perenox (4 oz. in 10 gals. water applied at the rate of 15 gals. per acre and plucked as in (1); this gave yields corresponding as nearly as possible to returns obtained in the absence of blister blight; (3) as for (2) but protected at ten-day intervals immediately following plucking; (4) unprotected; plucked at weekly intervals to the fish leaf, removing only shoots with a bud and two fully opened leaves; (5) unprotected, with normal estate plucking, the rounds being closed up to seven days.

During the five months under review ending in October, 1950, plot 4 gave an increase of 5 lb. made tea per acre above plot 2 and 20 lb. above plot 3. During the experiment severe stem attacks occurred continually so that the closing up of rounds during normal plucking was completely ineffective against the disease. The value of fish leaf plucking under these conditions was established beyond doubt; it is suggested that planters should experiment with this method during blister blight attacks as an alternative to spray protection. The need for a resting period with spray protection started three weeks before the end of plucking is also emphasized.

In conclusion the adoption of the suggested protective methods is recommended in badly affected areas before the capital value of the bushes is seriously reduced. An initial programme has been drawn up in which it is proposed that some 60 acres at St. Coombs (about one-fifth of the tea acreage there) will be replanted with high yielding, resistant clonal material over the next ten years.

J. Lamb (pp. 44–47) sums up the relative merits of crop protection by wet spraying compared with crop protection by dusting. Although spraying with perenox has proved to be completely successful in protecting tea recovering from pruning and in bearing under a wide range of terrain and climatic conditions one man is required for every seven acres protected and the total cost of spraying per acre per annum from pruning to tipping including the cost of equipment is approximately Rs. 60. In trials carried out on 200 acres at Kataboola in 1950 with the Whirlwind dusting machine [ibid., 30, p. 430] using 2 per cent. cuprosana dust from mid-October onwards during the north-east monsoon, the plucking programmes were altered to give a maximum interval between dusting and plucking. In a large-scale operation over 28 days with three labourers per day on an average, the cost of application was approximately 40 cents per acre per round inclusive, except for supervision, the average rate of working being 10 acres per hour. The total expenditure was Rs. 3·4 per acre or about Rs. 54 on a basis of 16 rounds. Therefore, if 10 lb. dust per acre applied at 10-day intervals proves sufficient to control blister blight in plucking, the cost of dusting will be about the same as for wet spraying. Large-scale dusting of tea recovering from pruning should not be risked until more evidence is available.

De Jong (P.). **More on the control of blister blight.**—*Plant. Chron.*, 46, 2, pp. 35–39, 1951.

The author summarizes the matter contained in the papers read at the symposium

on tea blister blight [*Exobasidium vexans*] in Ceylon [see preceding abstract] in December, 1950, and in conclusion outlines the possible future programme of the United Planters' Association of Southern India Scientific Department regarding the control of this disease [see next abstract]. It is intended to run a large-scale trial of 150 to 200 acres, probably in the Anamallais, to demonstrate the extent of protection afforded by copper dusts applied to first-year teas in plucking, using the 'Whirlwind' power duster [see preceding abstracts]. Small-scale dusting experiments under various conditions will also be tried. General recommendations are made regarding the use of dusts.

VENKATARAMANI (K. S.) et al. **A preliminary report on the trial of certain fungicides for the control of blister blight.**—*Plant. Chron.*, 46, 10, pp. 270–272, 1951.

In preliminary fungicide trials on tea carried out in southern India during 1950 for the control of blister blight [*Exobasidium vexans*: see preceding abstracts] perenox at 2 and 4 oz. per 10 gals. water [*R.A.M.*, 30, p. 390], British Schering fungicide containing 80 per cent. copper (2 oz.), and cuprokylt containing 50 per cent. copper oxychloride (4 oz.) were the most effective, the reduction in disease intensity over no treatment being 75 and 92, 63, and 70 per cent., respectively.

HENDERSON (R. G.). **Vamorr 48 and 50 ; two new flue-cured varieties of Tobacco resistant to mosaic and rootrot.**—*Bull. Va agric. Exp. Sta.* 427, 10 pp., 7 figs., 1949. [Received July, 1951.]

At Virginia Agricultural Experiment Station, Blacksburg, two newly developed flue-cured tobacco varieties, Vamorr 48 and 50, were found to be highly resistant to tobacco mosaic virus [cf. *R.A.M.*, 30, p. 548] and root rot (*Thielaviopsis basicola*) [ibid., 29, p. 457; 30, p. 508]. They remained free from mosaic when susceptible varieties were 100 per cent. infected.

WOODS (M. W.) & DUBUY (H. G.). **The action of mutant chondriogenes and viruses on plant cells with special reference to the plastids.**—*Amer. J. Bot.*, 38, 6, pp. 419–434, 64 figs., 1951.

In observations of living tissues at the National Microbiological Institute, Bethesda, Maryland, the cells of mature tobacco leaves infected with 2A, a typical 'green mosaic' strain of tobacco mosaic virus [*R.A.M.*, 29, p. 127], or with either of the two 'yellow mosaic' strains, 2A–1 and 1–C [loc. cit.], underwent modifications in plastid development [ibid., 25, p. 546] similar to those produced by mutant chondriogenes (hereditary determiners of plastids) in healthy leaves. Toxic agents, although causing marked chlorosis, did not induce these modifications. Yellow mosaic strains frequently exerted selective action on plastid maturation within the same cell. Mutation of the green mosaic strain to yellow mosaic types resulted in characteristic changes in the action of the virus on chloroplast development. Plants inoculated with either virus developed yellowish-green spots with diffuse borders, and all the chloroplasts in the cells of these primary lesions were reduced in pigment content and were one-half to two-thirds normal size. In cells infected with either of the yellow strains the chloroplasts were devoid of starch, while in cells infected with green mosaic the chloroplasts contained much starch even following periods of darkness. Cytological evidence of multiple infection of single cells with both parent and mutant viruses was obtained.

MCCOLLOCH (L. P.). **Alternaria tenuis the cause of a Tomato fruit rot.**—*Plant Dis. Reptr*, 35, 5, pp. 234–236, 1951. [Multilithed.]

Isolations from tomato fruits grown in California, Florida, Maryland, Texas, and Mexico and bearing *Alternaria* rot lesions were all strains of *A. tenuis* auct. as defined by Mason [cf. *R.A.M.*, 13, p. 327; 18, p. 766; 23, p. 364; 30, p. 522].

Chamberlain (E. E.) & Fry (P. R.). **Influence of method of Tomato seed extraction on seed transmission of Tobacco-mosaic and Tomato-streak.**—*N.Z. J. Sci. Tech.*, Sect. A, 32, 2, pp. 19–23, 1950. [Published February, 1951.]

In experiments carried out in the Department of Scientific and Industrial Research, Auckland, both the type and tomato streak strains of tobacco mosaic virus appeared in a small percentage of tomato seedlings raised from uncleaned seed [*R.A.M.*, 27, p. 587], but not in those from seed cleaned by fermentation or hydrochloric acid [ibid., 30, p. 361]. There is a relatively high concentration of virus contaminating the surface of uncleaned seed, but this amount is considerably reduced by cleaning. Tests with pulp remaining after seed extraction showed that fermentation does not reduce virus concentration but merely removes the infective pulp, whereas acid treatment inactivates the virus. Evidence indicated that the latter is carried only on the seed surface and seedlings become infected during or after seed emergence.

McClean (A. P. D.). **Bunchy-top disease of the Tomato: additional host plants, and the transmission of the virus through the seed of infected plants.**—*Sci. Bull. Dep. Agric. S. Afr.* 256, 28 pp., 10 figs., 1948. [Received June, 1951.]

In further studies on tomato bunchy top disease in South Africa [cf. *R.A.M.*, 17, p. 442; 24, p. 252] the virus was transmitted by mechanical inoculation and grafting to the following additional hosts: *Datura stramonium*, *Nicotiana glutinosa*, *Physalis angulata*, *Solanum giganteum*, *S. indicum*, and *S. sisymbrifolium*. The loss of pigment in certain areas of the petals of infected *N. glutinosa* and *Petunia* makes these valuable as differential hosts for the virus. It was transmitted from *D. stramonium* to tomato by grafting but not by mechanical inoculation. 'Severe disease' [ibid., 15, p. 124] was successfully transmitted by both methods from *Physalis peruviana* to the same host and was also recovered from tomatoes infected from it. It was recovered successfully by grafting from tomato, *N. glutinosa*, *S. incanum*, *S. sodomaeum*, and *Petunia*. Inoculation to tomato showed that with three exceptions all the experimental plants of *Physalis peruviana* contained bunchy top virus, irrespective of whether they developed 'severe disease' or remained apparently healthy. There is no evidence that this disease is a complex produced by more than one virus. The virus was recovered from seeds of *S. incanum*, *S. aculeatissimum*, *S. duplosinuatum*, *S. sisymbrifolium*, and *P. peruviana*; seedlings of *S. incanum* and *P. peruviana* acquired the virus from the seed.

Report on forest research for the year ending March, 1950.—126 pp., 1 pl., 11 graphs, London, H.M. Stationery Office, 1951.

In the section of this report [cf. *R.A.M.*, 29, p. 541, and above, p. 552] dealing with pathology (pp. 76–83) T. R. Peace states that some of the Scottish heathland nurseries were severely attacked by *Botrytis* [loc. cit.], particularly in the autumn. Sitka spruce [*Picea sitchensis*] and Douglas fir [*Pseudotsuga taxifolia*] suffered the most; Japanese larch [*Larix leptolepis*] and *Thuja* were also affected. This disease is likely to become a regular feature of heathland nurseries owing to the late growth and succulence of the seedlings, and the tendency to dense beds. Spraying experiments, with a view to controlling the disease under these conditions, were planned for 1950.

The completion of the survey of the dying of Scots pine on calcareous soils at Allerston Forest, Yorkshire, indicated that it is confined entirely to the oolitic limestone. Die-back of Corsican pine [*Pinus nigra* var. *calabrica*] in the same area is definitely distinct from the foregoing disease and has no connexion with limestone; a very bad outbreak of die-back also occurred at Thornthwaite Forest, Cumberland.

It is becoming increasingly evident that *Phaeocryptopus gaeumannii* is largely responsible for the slightly sick appearance of much of the Douglas fir in western Britain, especially Wales. It appears that the main effect of the fungus will be to retard the growth rate.

In a resistance trial at Alice Holt, Hampshire, numerous poplars were planted between rows of setts affected by bacterial canker [ibid., 30, p. 203]. All the trial plants were artificially inoculated with bacterial slime in 1950, as well as being exposed to natural infection. One clone of *Populus eugenei*, which comes into leaf nearly as early as *P. robusta*, is resistant to canker; another, coming into leaf a week later and highly susceptible, occurs all over southern England. So far the resistant one is known only on two estates in Norfolk, and at Kew and Edinburgh Botanic Gardens.

A rather serious outbreak of chestnut ink disease [*Phytophthora cinnamomi* and *P. cambivora*], unconnected with bad drainage, occurred at Garnons, near Hereford.

Both *Fomes annosus* and *Armillaria mellea* caused severe butt rot of *Tsuga*, two areas on low, damp ground being much less affected than those on higher ground. In the Gwydyr Forest the rot had entered almost entirely through the stumps of double stems which had been removed in early thinnings; if double stems of conifers reach thinning size either both should be left or both removed.

In further studies on *F. annosus* in East Anglian pine plantations [see above, p. 552] [J.] Rishbeth (p. 77) found that stump infection was greatly reduced if thinning was carried out after several weeks of dry weather, apparently because drought reduced the production of spores by the fungus. S. D. Garrett (p. 124) states that the incidence of stump infection was reduced to 3 per cent. by painting the cut surfaces with a 2:1 tar-creosote mixture. An experiment is in progress on the inoculation of stumps with *Peniophora gigantea* [ibid., 30, p. 295]. Since this fungus often prevents *Fomes* infection by decaying the stump first it may prove a more effective means of control than tar-creosote treatment. Even in the absence of inoculation *P. gigantea* exerts a natural check upon stump infection by *F. annosus*. Inoculations are made by driving in wedges of wood infected with *P. gigantea* or spraying the stumps with a basidiospore suspension. If this method of biological control should prove effective the cost need not be prohibitive since the first batch of inoculated stumps would provide ample inoculum for subsequent fellings.

J. H. Warcup (p. 107) gives three reports from June, 1949, to September, 1950, on experiments carried out on plots 15 by 16ft. at the Old Ampthill Nursery, Bedfordshire, to study the effect of partial soil sterilization by steam [ibid., 29, p. 557] or formalin [ibid., 30, p. 42] on the occurrence of soil fungi. The plots were sown with Sitka spruce three weeks later. Soil samples were taken before treatment, 48 hours after, and subsequently at approximately three-week intervals. Over 100 species of fungi were obtained [ibid., 29, p. 530], about one-third to one-half of which were of constant occurrence. *Pythium*, *Mortierella* [loc. cit.], *Mucor*, *Aspergillus*, *Chaetomium*, *Gliocladium*, *Fusarium*, *Penicillium*, and *Trichoderma* spp. were common. In a profile of an untreated plot most of the fungi were present throughout the worked layer to a depth of 10 in. Below this there were far fewer species, but *Penicillium* spp. were common [cf. ibid., 29, p. 532]. This division of flora is closely correlated with the two soil divisions in the profile of the Ampthill Nursery soil.

Samples taken immediately after steaming showed that nearly all the fungi and bacteria had been killed throughout the profile to a depth of 12 in. Most of the lower flora was still present. After three weeks a few colonies of an *Aspergillus* and two species of *Penicillium* were found near the surface. At six weeks *Mortierella* and *Trichoderma* spp. were present near the surface, plates from 6 to 12 in. being still largely sterile, while at nine weeks these two groups were present lower down.

Samples taken two days after formalin treatment showed that the chemical had penetrated only 1½ and 4 in. deep [in two plots], respectively. At three weeks the plates from 2½ and 5 in., respectively, and at six weeks from 4 and 6 in. remained sterile, while at nine weeks the flora, mainly *T. viride*, had returned to the surface areas and this species was still predominant eight months later. In August, 1949, there was a partial fungus flora throughout the whole soil profile of the steam-treated plots with *Mortierella* and several unidentified pycnidial fungi predominating, but it was greatly reduced compared with the control plots. Eight months later there was a partial fungus flora, consisting mainly of *Mortierella* and *Coniothyrium*. Sterilization by either method significantly increased the total number and mean height of the seedlings, steam sterilization giving taller seedlings than the formalin treatment. Considerable damping-off was observed on the control plots.

Siggers (P. V.). **Spray control of the fusiform rust in forest-tree nurseries.**—*J. For.*, 49, 5, pp. 350–352, 1951.

Experiments on the control of fusiform rust (*Cronartium fusiforme*) of slash and loblolly pines (*Pinus caribaea* and *P. taeda*) [*R.A.M.*, 30, p. 440] in southern nurseries were carried out in the Ashe Nursery, Brooklyn, Mississippi [cf. ibid., 22, p. 231], from 1947 to 1949 in co-operation with the United States Forest Service and the Southern Forest Experiment Station, New Orleans, Louisiana. In comparative tests in 1947 ten applications of sprays containing dithane Z–78, ferbam, and ziram, all with santomerse S spreader, and of goodrite type 4 (a 7:1 mixture of polyethylene polysulphide latex with a ziram-cyclohexylamine complex) without a spreader, reduced infection on slash pine nursery stock to less than 3 per cent. compared with 5 per cent. for Bordeaux mixture (8·8 lb. per 100 gals.) plus santomerse S and 13·4 per cent. for the unsprayed. In 1948 dithane Z-78, ferbam, ziram (all with spreader), and goodrite type 2 (ziram-cyclohexylamine complex), reduced infection to 1·2 per cent. or less compared with 2·9 per cent. for Bordeaux and 5·9 per cent. for the controls. In 1949 infection was reduced to less than 1 per cent. by ferbam and ziram (both with santomerse S) compared with 4·2 per cent. for the controls. Phygon sprays severely damaged seedling stands, while some damage also occurred in plots sprayed with Bordeaux plus sterox SK spreader and puratized N5E plus santomerse S. A single spray with ferbam and ziram in 1949 applied just before seven days of cool, moist weather reduced infection more effectively than seven subsequent treatments applied during a dry spell, demonstrating that rust infection may occur as the pine seeds germinate under burlap.

Stimpfling (J. H.) & Shubert (M. L.). **Iron fluctuations in Acer saccharinum.**—Abs. in *J. Colo.-Wyo. Acad. Sci.*, 4, 2, pp. 55–56, 1950.

Iron deficiency chlorosis [cf. *R.A.M.*, 22, p. 118; 26, p. 418] is commonly shown by the leaves of *Acer saccharinum* at Denver, Colorado, and throughout the western Plains area. Analyses of leaves collected throughout the 1949 growing season from widely distributed trees corroborated earlier findings that little correlation exists between the iron content of leaves and their colour. Extreme variation frequently occurred in the same tree. But analyses of buds collected in January, 1950, showed almost perfect correlation between low iron and chlorosis, assuming that the same chlorosis would occur in the same trees in the 1950 growing season. The evidence indicated that the iron necessary for chlorophyll synthesis must be stored in the tissues when the buds form.